

Training program-1
“Basics of power system planning and operation”

RETREAT, Gual Pahari Campus, TERI
 New Delhi

Programme

Day-1: June 3rd 2002 (Monday)

9:00 – 11:00 Session 1: Basics of power system

The purpose of this introductory session is to familiarize participants of about the commonly used terminology in the power system.

11:00 – 11:15 Tea/Coffee

11:15 – 12:45 Session 2: Introduction to system planning and operation

This session will discuss the various aspects of system planning and operations i.e. what it involves? How it is done? and what coordination is required with CTUs/CEA etc.

12:45 – 1:45 Lunch

**1:45 – 3:15 Session 3: Introduction to system planning and operation
 (continued)**

3:15 – 3:30 Tea/Coffee

3:30 – 5:00 Session 4: Grid Code and Supply Code

The session will discuss in detail the components of Grid and Supply Code. What it should contain?

Training program-2
“Tools and techniques of demand and load forecasting”

RETREAT, Gual Pahari Campus, TERI
New Delhi

Programme

Day-1: June 4th 2002 (Tuesday)

9:00 – 10:15 Session 1: Why forecasting?

This session will discuss the significance of demand and load forecasting in power system planning and operation. This session will also highlight the basic considerations for choice of methodology to be adopted given the reliability of information, constraints and desired level of accuracy etc.

10:15 – 10:30 Tea/Coffee

10:30 – 1:00 Session 2: Forecasting techniques

This session will discuss in detail various forecasting techniques for both short-term and long-term forecast and applicability of such forecasting techniques to Indian context.

1:00 – 2:00 Lunch

2:00 – 3:15 Session 3: D-1 forecasting

This session will discuss how daily and yearly load forecasting is carried out at the load dispatch centers.

3:15 – 3:30 Tea/Coffee

3:30 – 5:00 Session 4: Information requirement and challenges to forecasting

Demand forecasting is a challenging exercise given the associated uncertainties, the session will discuss the various corrective instruments adopted to overcome these challenges. This session will also discuss the information requirement for various demand forecasting approaches as discussed before, and present constraints in gathering the information in the desired format.

An exercise will be done to develop a data requirement

Day-2: June 5th 2002 (Wednesday)

9:00 – 10:15 Session 5: EPS's methodology

The session will discuss in detail the methodology being adopted by the EPS, CEA and comment on the same.

10:15 – 10:30 Tea/Coffee

10:30 – 11:45 Session 6: Case study

This session will familiarize the participants on the basis of a case study about the model determination techniques, scenario developments, and information collection problems etc.

11:45 – 1:00 **Session 7: Case study (continued)**

1:00 – 2:00 **Lunch**

2:00 – 3:15 **Session 8: Introduction to E-Views**

A commonly used software package for demand forecasting will be introduced in this session.

3:15 – 3:30 **Tea/Coffee**

3:30 – 5:00 **Session 9: Problem solving**

Secondary data would be provided to participants to develop appropriate Models on their own using E-Views.

Training programme-3
“Economics of tariff determination under independent regulation”

RETREAT, Gual Pahari Campus, TERI
New Delhi

Programme

Day-1: June 6th 2002 (Thursday)

9:25 – 9:30 Welcome/introduction to the Workshop

9:30 – 11:00 Session 1: The drivers for tariff reform

This session will discuss the broad structural changes in the industry and identify the role of tariff in facilitating the process. It will discuss how technological, commercial, financial, legal and social forces are evolving and their impact on tariff reforms. The discussion will be in context of the international as well as the national developments.

11:00 – 11:15 Tea/Coffee

11:15 – 12:45 Session 2: Economic principles

This session will discuss the basic principles of micro-economic theory that could form the basis of an ideal tariff fixation exercise. The basic concept of historic cost and marginal cost will also be introduced along with their pros and cons. The other issues discussed would be role and rationale of economic regulation, demand supply relationship etc.

12:45 – 1:45

Lunch

1:45 – 3:15

Session 3: Finance and accounting

Introduction to basic finance and accounting principles and their relevance to the regulatory tariff proceedings.

3:15 – 3:30

Tea/Coffee

3:30 – 5:00

Session 4: The rate making methodologies

This session will discuss the cost plus methodology and the performance based rate making. This discussion will include the provisions relating to tariff setting in the existing laws including the Schedule VI, Sec 59 the ERC Act. Some of the state experiences with these in the Indian environment will be discussed. Besides this, experience with MTY and PBR in developed markets shall also be highlighted.

Day-2: June 7th 2002 (Friday)

9:30 – 11:00 Session 5: Procedural and process aspects

This session will discuss the procedural aspects of the current regulated scenarios such as public hearings, publishing

advertisements, availability of information, data filing requirements etc.

11:00 – 11:15

Tea/Coffee

11:15 – 12:45

Session 6: Case Study-1

Introduction to case study

12:45 – 1:45

Lunch

1:45 – 3:15

Session 7: Determination of revenue requirement

The revenue side of the tariff determination exercise will be the focus of this session where treatment of different elements of revenue requirement including the power purchase, fuel costs, O&M costs depreciation, interest, employee costs etc. will be discussed.

3:15 – 3:30

Tea/Coffee

3:30 – 5:00

Session 8: Tariff design

This session will discuss various techniques in designing rate schedules including ramsey pricing and marginal cost based tariff. It will also discuss calculation of the cost of supply, cross subsidization and techniques for administration of subsidies.

Day-3: June 8th 2002 (Saturday)

9:30 – 11:00

Session 9: Case Study-2

Group interaction

11:00 – 11:15

Tea/Coffee

11:15 – 12:45

Session 10: Case Study-3

Group interaction

12:45 – 1:45

Lunch

1:45 – 3:15

Session 11: Case Study-4

Presentation by groups and panel discussion.

3:15 – 3:30

Tea/Coffee

Training program-4
“Efficiency improvements: Scope, challenges and best practices”

RETREAT, Gual Pahari Campus, TERI
New Delhi

Programme

Day-1: June 8th 2002 (Saturday)

2:00 – 3:00

Session 1: National and international scenarios

This session will present an overview of transmission and distribution losses in the SEBs & private utilities in the country and abroad along with a comparison with available standards. The session will also highlight the approaches being adopted by utilities in defining and estimating T&D losses.

Day-1: June 8th 2002 (Saturday)

3:15 – 5:00

Session 2: Measurement of losses and information requirements

This session will present the methodology for realistic estimation of T&D losses and its component i.e. technical and commercial losses with the help of an example, and will also discuss the various factors influencing the selection of a representative sample size, reasons for high losses (technical and commercial).

Day 1: June 9th 2002 (Sunday)

9:30 – 11:00

Session 3: Tools for reducing losses

This session will familiarize participants with various technical and administrative measures for reducing technical and non-technical losses. Strategies for improving the efficiency of MBS activities & alternate DSM options for reduction of losses shall also be discussed.

11:00 – 11:30

Tea/Coffee

11:30– 1:00

Session 4: Cost-benefit analysis of options for reducing technical and commercial losses

This session will present cost-benefit analysis of various energy efficient technologies for reducing the losses with the help of a case study.

1:00 – 2:00

Lunch

Day-3: June 10th 2002 (Monday)

9:30 – 11:00

Session 5: Regulatory treatment for reducing technical and commercial losses

This session will discuss the general regulatory approaches for reducing technical and commercial losses adopted by various

regulatory agencies mainly in other parts of the world & compare the same with the Indian experience. The session will also discuss the framing of loss reduction targets, time path for achieving reduction in losses etc. and the various mechanisms to incentivise or penalize these achievements or under achievements. The concept of sharing of benefits due to loss reduction shall also be introduced.

11:00 – 11:15

Tea/Coffee

11:15 – 12:45

Session 6: Issues related to supply and use of coal

The session will discuss the various issues such as techno-commercial evaluation of coal vis-à-vis plant efficiency, government's directive of using coal having 34% ash content and problems in coal supply to power stations etc.

12:45 – 1:45

Lunch

Day-4: June 10th 2002 (Monday)

2:00- 3:00

Session 7: Issues related to supply and use of coal (continued)

3:00- 3:30

Tea

Training program-4
“Efficiency improvements: Scope, challenges and best practices”

RETREAT, Gual Pahari Campus, TERI
New Delhi

Programme

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2:00 – 3:00

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2:00- 3:00

Session 7: Issues related to supply and use of coal (continued)

3:00- 3:30

Tea

Reforms in the Power sector in South Asia
Impacts on the under-privileged

Background Paper

Presented at the Seminar on
Power Sector Reforms and Privatization
Bangalore, India
15-17, May 2000

TERI
New Delhi

Reforms in the Power sector in South Asia

Impacts on the under-privileged

Leena Srivastava¹ and Pallavi Paul²

Introduction

The electricity sector, as other infrastructure sectors, in South Asia is undergoing a process of major restructuring and regulatory reform. The wave of privatization and the associated desire to create competition, in the belief that this would be in the interest of consumers, is sweeping over this region too. However, it needs to be recognized that the starting point for the countries of the South Asian region is significantly different to that of the more developed countries that are leading the creation of these new market models. In attempting to emulate the market and regulatory structures of the west the region must be sensitive to such differences. This paper attempts to: describe the socio-economic status of the countries of the region, highlight the characteristics of the electricity sector in the region, the driving forces for restructuring and reform, as well as the challenges that this poses particularly for the more vulnerable sections of the society – referred to here as the “under-privileged”. A more detailed definition of this term follows in one of the subsequent sections.

The South Asian countries: A profile³

The countries of the South Asian region have significant socio-cultural similarities. While the sub-continent accounts for 20% of the world's population, it also houses 40% of the world population living under the poverty line (described as income of less than \$ 1 per capita per day). Table 1 provides some key indicators for the sub-continent as a whole while table 2 presents some information on poverty levels in the region. High levels of poverty in a country pose a major challenge to utilities in the form of ensuring greatest possible accessibility to electricity while ensuring their financial viability. As is obvious from the tables, with around 35% of the sizeable population in this region living below the poverty line, this is a challenge of significant proportions in South Asia. The fact that most electric utilities are owned and operated by the Government exacerbates the problem for two related reasons:

- The tendency to use this sector as a means for provision of subsidised services
- Competing demands on limited budgetary resources. The high levels of poverty and the accompanying poor performance on several key social parameters places tremendous pressure leading to a sub-optimal allocation of these resources.

However, poverty apart, and possibly because of the low GDP base, this region has also

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³ Information on the Countries obtained from World Factbook 1998.

been experiencing one of the fastest rates of economic growth (over 5% per annum) in the years 1998/99 and 1999/00. It is also expected that the growth in the next few years will be robust and the governments of these countries are putting in place several measures to ensure the same.

Table 1: Key indicators of South Asia

Population (10 ⁶)	1,305	Popn Growth %	1.9
Surface area (000 Sq Kms)	5,140	Popn/sq.km	273
GNP (\$ millions)	560,069	GNP per capita \$	430
	1990	1997	1998
People			
Life expectancy (years)	59	62	62
Infant Mortality Rate (per 1000 live births)	87	77	75
Under 5 mortality rate (per 1000 children)	121	100	89
Child malnutrition (% of children < 5)		53	
Urban Population (%)	25	27	28
Illiteracy – male (% of people >15 yrs)	41	36	35
Illiteracy – female (% of people > 15 yrs)	66	60	59
Economy			
GDP (\$ billion)	410	553	565
GDP growth (Annual %)	5.6	4.6	5.6
Value added in Agriculture (% of GDP)	30	27	28
Gross domestic investment (% of GDP)	23.3	22.5	22.7
Overall budget deficit (% of GDP)	-7.2	-5.8	-5.4
Technology and Infrastructure			
Energy use per capita (kgoe)	394	443	n.a
Electricity use per capita (kWh)	228	324	n.a
Telephone mainlines (per 1000 people)	6	17	19
Personal computers (per 1000 people)	0	2	3
Paved Roads (% of total)	38	35	57

Source: www.worldbank.org/data/countrydata/littledata/13.pdf

Table 2: % Population under poverty line

	Sri Lanka	Pakistan	Nepal	India	Bangladesh
Population below poverty line (%)	35.3 (1990)	34 (1991)	42 (1995)	35 (1994)	35.6 (1998)

Source: *World Factbook 1998*

There have been sustained domestic and international efforts to improve the economic and demographic prospects in Bangladesh. The government of Bangladesh has recently made progress in improving the climate for foreign investors and liberalizing the capital markets.

India, which accounts for the largest population in the region, and a proportionately high

number of the poor, has been on the path of economic reforms since the beginning of the 90s. In June 1991, the country with a focus on stabilizing the economy; began reforms and the declining economic role of the public sector since the start of the program is probably India's most fundamental structural change since independence. The reforms have witnessed expansion in private investment and foreign investment (at \$2.4 billion in 1998-99, foreign direct investment is about 20 times higher than the pre-reform era) primarily in the infrastructure sector.

Since May 1991, the Nepal government has been moving forward with economic reforms particularly those that encourage trade and foreign investment. Nepal has considerable scope for accelerating economic growth by exploiting its potential in hydropower and tourism, areas of recent foreign investment interest.

Pakistan too has been implementing a comprehensive program of stabilization and structural reforms aimed at correcting the country's unsustainable macroeconomic imbalances, reversing the trend of declining economic growth, and promoting human development and poverty alleviation. As a result real GDP grew by 4.3 percent in 1997-98, compared with only 1.9 percent in 1996-97 and annual inflation declined from nearly 12 percent to 8 percent.

The reforms initiated in Sri Lanka in 1996 helped jump-start the economy and GDP grew by 6.4 percent in 1997. After three consecutive years of high budget deficits in the range of 9.5-10 percent of GDP, the fiscal imbalance narrowed to 7.9 percent in 1997 with the implementation of various fiscal measures. Improvements in regulatory and incentive systems have increased private participation in infrastructure, including power generation, telecommunications and ports.

The electricity sector in South Asia

The status of the electricity sector in terms of production, percentage share of different sources in the total production, consumption and per capita consumption is provided in Table 3 below. Though the figures available are for the year 1994, but it provides an overall understanding of the sector as well a basis for comparison among all the South Asian nations.

A review of the electricity sector in each country of the region reveals that they share certain common characteristics (that are partially evident from table 3) and experiences:

- Most of the nations are subject to constrained demand as well as a low level of access to electricity (in some areas only 15-20 per cent of population has access to electricity). Hence, substantial increases in generating capacity would be required in the near future to enable access to electricity services to a wider base of population.
- An insufficient investment in transmission and distribution system, besides poor connectivity between systems, reducing the reliability of the grid.
- Due to the above two reasons, most nations suffer from an erratic power supply situation.
- The system losses are very high ranging from near 40 per cent (for India) to 24 per cent (for Nepal) in FY 1994, which, in addition to technical losses, include high

commercial losses on account of pilferage, erroneous billing and metering, unmetered rural supply.

Table 3: Electricity Indicators (1994)

Indicators	Bangladesh ¹	Bhutan ²	India ³	Nepal ⁴	Pakistan ⁵	Sri Lanka ⁶
Electricity generating capacity (MW)	2608	347.99	81171.3	288	11556	1409
Electricity production by source (%)						
Hydro	8.8	98.3	25.0	83.5	40.9	80.7
Thermal	89.3		75.0		59.1	3.5
Others	1.9	1.7		16.5		15.8
Electricity generation (GWh)	9785	1685.8	350490	920	50677	4364
Electricity generation by fuel (%)						
Hydro	8.7	99.64	23.0	94.0	38.4	93.7
Thermal	84.6		71.0			2.0
Nuclear			4		1.2	
Others	0	0.36		6.0	60.4	4.3
Electricity Consumption (GWh)	5743	176.5	262747	719	37381	3565
Market share (%)						
Residential	37.7		18.2	38.27	37.8	26.0
Commercial	8.4		6.0	13.77	6.8	16.3
Agriculture	4.4	n.a.	30.2	2.67	15.4	
Industry	46.4		37.9	40.53	33.8	39.4
Transport			2.2	1.36	0.1	
Others	3.1		5.5	3.41	6.1	18.3
System losses (%)	37.6	*11.1	22.2	23.5	26.1	18.16
Per Capita Consumption kWh (1996)	143	70	324	46*	474*	276*
Percentage population with access to Electricity²	14	15-20	80	15	Less than 50	50-55

* Calculated on the basis of information on consumption of electricity and total population and annual growth rate of population.

1. BPDB only

2. DOP and CPA data

a Dept of Power only

3. All sectors – from Annual Report on working of SEBs, April, 2000

4. NEA data only, including net import from India of 38 GWh

5. WAPDA, KESC and KANUPP data only

Source. 1. Electric Utilities Data Book, ADB, 1997

2. www.eia.doe.gov, 1998 estimates

⁴ BPDB: Bangladesh Power Development Board; SEB: State Electricity Board; NEA: Nepal Electricity Authority.

- The average tariffs are generally much below the cost of supply, with average tariff for sale covering around 80 per cent of the average unit cost in FY 1994 (82% in BPDB - Bangladesh, 81.14 % for overall SEBs in India (1993), 78% for NEA – Nepal and 80% in Pakistan (July 1995)). This has resulted in acute financial crisis in the sector⁵.

With continuous growth in demand for electricity coupled with poor T&D system resulting in severe shortages, the sector requires substantial investments for sector improvement as well as augmentation. But given the poor financial condition of the utilities, the sector is unable to inject funds from its own resources.

It is estimated that the energy shortages in India are costing the economy nearly 2% of its national income, and to meet its peak demand in the year 2011-12, it needs to have 176,647 MW of generating capacity⁶, which is nearly double the present capacity. In the case of Pakistan, the peak shortages as estimated in 1996 were around 2000MW, which led to economic losses to the order of US \$1 billion annually⁷. Sri Lanka, too faced severe power shortages during the same time, which was expected to improve with the commissioning of the 40MW Sapugaskanda diesel power plant and 115 MW Kelanitissa gas turbine. Though the situation has improved, but the shortages still persist. In Bangladesh, the industry lost nearly 22% working hours due to power shortage. Though both Nepal and Bhutan have a very small consumer base, but the losses registered are still high, primarily due to poor T&D system as well as high-unmetered supply. Thus, while an improvement of the system would partially solve the shortage problem, the projected growth in electricity demand at a rate of 6.7% per annum during 1993-2010⁸ in South Asia calls for significant capacity additions. Thus most of the countries in the region, have realised that the need of the moment is augmentation of generating capacity, and recognising the inability of the utilities to generate resources have resorted to private and foreign investments in the sector.

Nature of reforms

In the South Asian countries, the business of electricity generation, transmission, distribution and supply has traditionally been a public sector monopoly. For Bangladesh, India and Pakistan, who shared a common history, the electricity Act of 1910 was the basis for the development and functioning of the electricity sector. In the post 1947 period, these countries modified the basic 1910 Electricity Act but the substance and structure of the sector remained quite similar.

⁵ BPDB: Bangladesh Power Development Board; SEB: State Electricity Board; NEA: Nepal Electricity Authority.

⁶ Fifteenth Electric Power Survey of India, Central Electricity Authority, July 1995.

⁷ Aurangzeb Khan, "Bilateral Cooperation in the Energy Sector, Regional Cooperation in South Asia: Prospects and Problems, Occasional Paper No. 32, The Henry L Stimson Centre, Washington DC, February 1997.

⁸ TERI, "The Viability and Feasibility of Energy Cooperation in the SAARC Region" December, 1997.

The electricity sector in all of the South Asian countries has been viewed as a mechanism of delivering social largesse with an eye on the voting constituencies of politicians but, paradoxically, with scant regard to the social impact of the same. Thus, while undoubtedly the statistics indicating the level of electrification in countries of the region show major improvements, a large percentage of the population below the poverty line has no access to this resource, as also a significant part of the poorer population above the poverty line too. At the same time, the mechanisms devised to provide this social largesse - subsidies and unmetered supply to farmers - have been exploited by both the utilities as well as the consumers at large leading to a financial demise of the sector.

As such, by the early 1990s the situation with regard to the further development of this sector seemed absolutely dismal and the governments of the region had to recognize the inevitability of seeking private participation in the sector. This was accompanied by a shift in the focus of development organizations such as the World Bank and the Asian Development Bank from financing investment projects, the resultant impacts of which were dulled by the large inefficiencies effecting the sector, to financing structural reforms aimed at improving the efficiency of delivery of services at an institutional level.

However, as experience has shown, the governments' desire to invite the private sector to participate was easier said than done. The financial position of the state owned public utilities was so precarious, and the extent of mismanagement such, that the private sector was reluctant to subject itself to the high-risk exposure perceived. This current scenario of the public utilities, accompanied by a not-so-optimistic projection of revenue inflows, resulted in the private sector seeking recourse to mechanisms such as sovereign guarantees, escrow accounts (which provided little solace because of the relatively low potential for coverage it provided), high insurance premia etc. The sum and substance of this whole process has resulted in the entire restructuring/reform exercise aiming at:

- Evolving a more efficient operational structure through corporatisation and/or privatisation and tariff rebalancing
- Creating/inviting competition through a functional unbundling and an open bidding process for generation expansion and distribution functions
- Redefining the role of the government in the sector by encouraging it to divest the roles of owner of assets and regulator, retaining only its role as a policy maker
- Instituting independent regulation through the enactment of appropriate legislation
- Promoting the concept of transparency in the entire electricity business

with the end objectives of improving the financial attractiveness of the sector, eliminating shortages and evolving a price regime that would reflect the market value of providing a particular service.

The under-privileged

In this paper, the under-privileged have been understood to be those who have:

- absolutely no access to electricity services (would comprise largely those who are under the poverty line but may include those in geographically disadvantaged areas

as well),

- who have a limited ability to pay,
- who have little or no say in the restructuring of electricity markets nor in the markets for their produce (would include the agricultural and residential consumers).

It is obvious from the above definition and the discussion in the previous sections that the under-privileged would form a significantly large, if not a major, share of the total population of this region. The above segments of population are considered under-privileged, and hence requiring the special attention of the regulator for a variety of reasons, apart from size:

- The process of reform and privatisation would be dictated by the need to add capacity, improve efficiencies, rebalance tariffs and generally improve the attractiveness of the sector. The under-privileged as defined above may benefit from the process at some time in the not-so-near future. On the other hand they could very well be victims of the process by their very status in the economy and for other reasons listed below.
- This group is unlikely to have access to information sources that may enable them to influence the process – assuming, of course, that they are able to analyse the impacts of the process itself.
- While some segments of the above population may succeed in gaining access to electricity grids, they have little control on the quality of electricity and service provided.
- The pressure to improve the financial attractiveness of the electricity sector may actually push it further out of the reach of the poor, due to increased tariffs.

It can very well be argued that the above segments of the population have always had to face severe constraints with respect to access to reliable electricity and the reform process is not adding to their deprivation. On the other hand, it would be socially unjust and economically short-sighted to design a system that would continue to exclude this large segment of the population from access to quality electricity services for any length of time. As such, it is extremely important to build in, a priori, the safety mechanisms to cater for the under-privileged.

Electricity reforms in South Asia: Directions and issues

Before an analysis of the impact of power reforms on the underprivileged can be undertaken, it is important to understand the general directions in which power reforms are moving and the broad implications of the same. As mentioned in the earlier section, the end objectives of the reform process and the means of achieving the same are broadly well known. Although the process was initiated in most countries in the early 1990s there is little progress to show thus far, largely due to the enormity of the problems facing the utility – not the least of which are its data management processes.

However, from the limited experience available thus far, it is evident that, while the roles and responsibilities of the various entities involved are still being fine-tuned, the

governments (federal or state) would have to make the decision on the structure of the industry and the extent of autonomy/privatization to be undertaken. The independent regulatory commissions established thus far have varying levels of responsibility and are at very different points of maturity but would function largely within the framework provided by the reform acts and under the policy guidance of the Government.

This in itself provides a challenge to the regulatory commissions, as they are responsible not only for ensuring an efficient operation of the system but also to encourage private participation and protect the interests of the consumers. Herein lies the paradox – the long term interests of the consumers lie, as per most reform consultants, in a rebalancing of the tariffs to reflect more accurately the true cost of supplying electricity to each category of consumers. And, it seems obviously, any effort to rationalize the tariff structure would imply the need to reduce tariffs to the consumers at higher voltage levels and substantially increase tariffs to consumers at the LT level – largely the residential sector. The agricultural sector, as is well known, gets almost free electricity.

The task of rebalancing tariffs is complicated by the fact that transmission and distribution (T&D) loss levels are very high - estimated anywhere between 30% to 50%. A significant part of these losses represent theft of electricity and is a reflection of the poor management of the electric utility. Current tariff proposals being made to regulatory commissions internalize these high losses and the proposed tariff structures, therefore, reflect the cost of meeting the net consumption demand. The legitimate question that would then arise is: should the paying consumer be penalised for the thefts that are taking place in the system?

Table 4 gives an idea of the impact of such commercial thefts on tariffs. The three scenarios given here represent real data for a particular state in India. The table brings out the fact that the higher the estimated losses in the system, the higher the assumed subsidy for LT consumers and the greater the pressure for tariff increases. This is also a function of the assumed levels of losses attributable to different sectors. Traditionally, the belief was that it was largely the agricultural sector, followed by the residential that were responsible for the unaccounted electricity. Sample surveys undertaken more recently would tend to place a larger responsibility on the industrial and commercial sectors. This is obviously an unfair and an unsatisfactory situation.

Table 4: Scenarios on implicit subsidies at various voltage levels*

Head		Transmission EHT	Distribution HT	Distribution LT	Total
<i>Cost of supply @ 12% loss</i>	<i>Rs./kWh</i>	<i>2.33</i>	<i>2.54</i>	<i>3.13</i>	<i>2.90</i>
<i>Cost of supply @ 16% loss</i>	<i>Rs./kWh</i>	<i>2.33</i>	<i>2.57</i>	<i>3.27</i>	<i>3.00</i>
<i>Cost of supply @ 30% loss</i>	<i>Rs./kWh</i>	<i>2.25</i>	<i>2.65</i>	<i>3.77</i>	<i>3.34</i>
<i>Average tariff realised</i>	<i>Rs./kWh</i>	<i>3.74</i>	<i>3.97</i>	<i>1.16</i>	<i>2.04</i>
<i>Subsidy @ loss of 12%</i>	<i>Rs./kWh</i>	<i>-1.41</i>	<i>-1.43</i>	<i>1.97</i>	<i>0.86</i>
<i>Subsidy @ loss of 16%</i>	<i>Rs./kWh</i>	<i>-1.41</i>	<i>-1.39</i>	<i>2.11</i>	<i>0.96</i>
<i>Subsidy @ loss of 30%</i>	<i>Rs./kWh</i>	<i>-1.48</i>	<i>-1.31</i>	<i>2.62</i>	<i>1.30</i>

*The calculations are for the FY1999-00 and are based on following assumptions:

1. EHT is above 33KV, HT is above 11KV and LT is below 11KV.
2. Cost includes 3% ROR that utilities are allowed to earn,
3. The cost is allocated among the different voltage ends on the basis of energy sales.
4. The non-technical losses are allocated primarily between HT and LT.
5. The revenue includes subsidy amount.
6. The average realisation is calculated simply from the revenue collected and sales figures pertaining to each voltage level.

Courtesy: Gaurav Bhatiani, Research Associate, TERI

The other challenge posed to the regulatory commissions lies in estimating the true cost of supply and the level of subsidy itself. As stated by Irwin 1997 "Charging different customers different prices for the same product does not always imply a cross-subsidy. ... In general, when there are common fixed costs of production to be allocated among customers, economic efficiency requires that prices vary according to customers' sensitivity to price changes. ... But as long as all prices fall between the stand-alone and the incremental cost, the price differences do not contain cross-subsidies". In the current situation, in countries of the South Asian region, cost allocations are being done very simply, albeit with a large number of assumptions due to a paucity of data, on a historical cost basis. These costs are being allocated to various voltage levels representing different types of consumers with no reference to time-of-day or time-of-season demand, or indeed price sensitivities.

Taking the industrial sector as an example, Table 5 presents the costs of meeting electricity demand by industries using different fuels and technologies through captive generation. As such the numbers in this table would provide an estimate of the stand-alone cost of meeting industrial electricity demand. The fuels most commonly used in India are coal and fuel oil. While the stand alone costs on the basis of natural gas as a fuel are cheaper, the availability of natural gas is fairly limited. Given that a significant percentage of the industrial load is contributed by industry that is not continuous process, the stand alone costs as given below for a single shift or two-shift operations are likely to fall somewhere between the estimated cost of supply and current average revenue realisation (Table 4). As such, the true level of negative subsidy on industry is likely to be significantly lower than is brought out in Table 4.

Table 5: Estimated cost of stand-alone captive power

		Single shift (2400 hrs)	Two shift (4800 hrs)	Continuous process
Technology	Fuel	Cost(Rs/kWh)	Cost(Rs/kWh)	Cost(Rs/kWh)
CCGT	LPG	n.a	3.58	3.21
CCGT	Natural Gas	n.a	2.04	1.68
GT Open cycle	LPG	5.38	4.56	4.28
GT Open Cycle	Natural Gas	3.08	2.26	1.98
GT Open cycle	Naphtha	6.93	6.10	5.83
DG Set	Fuel Oil	4.31	3.40	3.10
Steam Cycle	Coal	n.a	2.78	2.26

Assumptions

1. All costs for a 2.5 MW unit based on design efficiencies
2. O&M costs 2.5% of capital cost
3. The annualized cost is calculated on the basis of capital investment, capital recovery factor (CRF) and annual O&M and fuel cost.
4. The CRF is calculated taking into consideration the debt-equity ratio, cost of debt, and assumptions made on system operating life, the system tax life and the marginal tax rate. (refer Hagler, Bailly & Company)

Courtesy: Pradeep Dadhich, Fellow, TERI

As such, apart from the unfairness of penalising paying customers, the assessment of cross-subsidy between the sectors is possibly over-estimated. Regulatory commissions should focus their efforts towards a gradual rebalancing of tariffs using innovative tariff design principles. Greater efforts also need to be made towards gathering a better understanding of demand drivers and estimating the costs of stand-alone services. The currently apparent pre-occupation with cross-subsidies is misplaced and pre-mature. The agricultural/rural sector is also often accused of being the primary factor responsible for the poor performance of utilities. The argument put forward is that this sector is either not paying for the electricity it consumes or is paying a flat tariff that does not reflect either the cost of supply or the efficiencies possible. While undoubtedly some amount of subsidisation of this sector prevails, the actual calculation of such a subsidy should once again take into account not only the time of the day when electricity is made available to the sector but also the quality of supply. Purely on the basis of the quality of supply received by the sector in the States of Gujarat and Haryana, the implicit tariff that an agricultural consumer pays works out to over Rs. 0.47⁹ and Rs 1.32¹⁰ per kWh respectively. However, it also needs to be recognised that the same consumers (around 58 per cent of the rural households) are also will to pay as much as 50 per cent higher for quality service.

The other implication of the reform/restructuring process is the desired higher level of participation of the private sector in generation and distribution services in the sector.

Table 6 brings out the extent to which the private sector has responded to the invitation to participate in the electricity business in India. In the flush of excitement immediately following the announcement of the reforms programme, the expressions of interest from these players amounted to a capacity addition of well over 100,000 MW. However, a

Table 6: Extent of private participation

Generation	Public		Private	Total MW
	State	Central		
March '91	63344		2742	66086
March '94	73729		3024	76753
March '95	77625		3546	81171
March '96	79418		3876	83294
March '97	58777	29061	8427	87839

Source: Ministry of Power, Annual Report, 1997-98

⁹ Electrowatt Engineering Ltd & TERI, "Development of a framework for Electricity Tariff in Gujarat" ADB TA No. 2379 IND, September 1996.

¹⁰ TERI, "Cost of unserved energy" Report No. 98PG42, pp ix.

number of these projects fell by the wayside as the true status of the sector started emerging.

As long as the responsibility for the provision of electricity services was in the public domain, the cost of capital was lower due to the public sector's access to long-term government financing and the insurance and foreign exchange premia being absorbed within the government set-up. As such, it can reasonably be expected that the price per unit of service would go up with the participation of the private sector. This could, of course, be offset by the potentially higher efficiencies, but the extent to which this may be feasible is a function of the liabilities that such entities might be asked to carry forward.

In addition, the extension of transmission and distribution facilities to low-density areas - typically the rural regions - would pose a challenge to profit-seeking businesses. In the words of Powell and Starks (May 2000) "Extending a network can be very expensive - a major barrier to access for poor households and small or isolated communities." They conclude that "Reform of grid-based electricity provision will not revolutionise access by the poor. ... As long as the introduction of competition and profit-seeking private participation is combined with regulation and tariff design that is sensitive to the needs of the poor, electricity reform is a positive step". In other words, special provisions/directions would need to be provided to the entities engaged in the electricity business, if the poor are not to be excluded from the benefits of this service. The regulators would obviously have to work in conjunction with the Government to facilitate this access in the most efficient manner.

But beyond providing access to electricity, are issues relating to metering and billing. For a utility it is often cost ineffective or logistically difficult to reach the rural or urban poor (due to distance or lack of proper address) to address their grievances or carry out meter reading. Thus the traditional mechanisms adopted for consumer interface are often ill equipped to address these administrative and logistics problems¹². Hence the reforms which would lead to high cost power, if not accompanied with improved billing and collection, would further act as a disincentive. Successful experiences, such as those in Chile that auctioned subsidies for rural electrification or Bangladesh that established rural co-operatives effectively, should be drawn upon and combined with innovative tariff designs to address the above problems.

International experience in protecting the poor

The United Kingdom and the United States of America are the leaders of the electricity sector restructuring revolution sweeping the world. While, undoubtedly, these countries are highly developed, speaking in relative terms, they have their share of the poor too. So, do these countries adopt a system of pricing based completely on market criteria and

¹¹ Alan Townsend, "Energy access, energy demand and the information deficit", ESMAP, Energy and Development Report 200. pp. 12.

¹² Perelope J. Brooke & John Besant-Jones, "Reaching the poor in the age of energy reform", ESMAP, Energy and Development Report 200. pp. 3.

expect subsidies, if any, to be provided by the Governments? Is there an element of “cross-subsidy” built into their tariff structures? Issues of quality and access are likely to be unimportant in these countries leaving tariffs as the major point of comparison.

In the UK, the Office of Gas and Electricity Markets (OFGEM) has, in March 2000, put out a document called the Social Action Plan (SAP) which sets out a programme of work to tackle what is termed as fuel poverty. Taking the WHO recommendation of indoor temperatures being in the range of 18 – 21 degrees Celsius, they have estimated that 5 million households spend 10% of their income on fuel to heat homes. The causal factors of fuel poverty have been listed as: low income, condition of property, efficiency of heating system, size of property and the price of fuel. While the Government has set itself the target of eliminating fuel poverty and has set up a Social Exclusion Task Force to address this issue, OFGEM is also trying to define its own role towards this objective. Broadly speaking, the SAP identifies two areas of regulatory intervention: license changes and structural changes, while also identifying areas that would require further research. Licence obligations of electricity and gas suppliers in the UK already include¹³:

- a legal obligation to supply domestic customers;
- the requirement to publish prices, and to provide a range of payment methods, including cash and other credit terms (subject, in certain circumstances, to provision of security or a prepayment meter);
- procedures to ensure domestic customers in genuine payment difficulties are treated sympathetically;
- a range of special services for elderly, disabled or chronically sick customers who may register their needs. Services include special passwords, meter repositioning, special controls and adaptors for appliances and meters, etc;
- arrangements for providing energy efficiency advice.

In the case of the USA, the National Association of Regulatory Utility Commissioners (NARUC) in their 109th annual convention in November 1997 through a resolution urged “congress, as it considers legislation to restructure the nation’s electricity industry, to include in such legislation workable mechanisms to support State and Utility public benefits programs such as energy efficiency, renewable energy technologies, research and development, and low income assistance...”. Several states in the US are imposing a “system benefits charge” or a “distribution fee” on consumers¹⁴. While the System Benefits charge is designed to fund public benefits programs such as renewable energy, energy efficiency, R&D, as well as assist low-income consumers, the distribution fees are focussed on providing assistance to low income consumers. There is, thus, an obvious cross-subsidy built into the tariff structure.

The following quote from the restructuring act of the State of Massachusetts makes the subsidy even more apparent: “The department shall require that distribution companies

¹³ Office of Gas and Electricity Markets, “The Social Action Plan”, UK, March 2000.

¹⁴ “State Utility Restructuring Legislation”, compiled by LIHEAP Clearinghouse.

provide discounted rates for low income customers comparable to the low-income discount rate in effect prior to March 1, 1998. ... The cost of such discounts shall be included in the rates charged to all customers of a distribution company. Each distribution company shall guarantee payment to the generation supplier for all power sold to low-income customers at said discount rates. ... Each distribution company shall conduct substantial outreach efforts to make said low-income discount available to eligible customers and shall report...". This last statement places the onus on the distribution company to seek out qualifying low income households and provide them the discount (read: subsidy).

As such, not only is the cost of subsidy being borne by all other customers, but the generation and transmission entities are being insulated from this process. The onus of providing such assistance to low-income customers, in a pro-active manner, lies squarely with the distribution company.

Social Pricing options ¹⁵

The arguments and the evidence put forward in the previous sections clearly indicates that the under-privileged constitute a consumer category of the electricity industry, that requires special treatment. International experiences show that even developed countries provide for the low income households in their tariff design. This section provides a review of various social pricing mechanisms that have been developed and implemented in different countries.

As the reform process requires rationalising of prices and user charges to the appropriate levels, hence it may require special transitional approaches and pricing mechanisms to offset the costs to low income households. If well-designed, such schemes would facilitate cost recovery by the utility while at the same time cushioning the impact on incomes, thereby facilitating the price rationalisation. A number of approaches could be considered including lifeline rates, vouchers, increasing social assistance payments, and general adjustments to wages and pensions. These are discussed below. However, it needs to be noted that some of the proposed mechanisms are more applicable in a well-defined social assistance programme, which is absent in most of the South Asian countries.

"Lifeline" rates: Lifeline rates set prices for small volumes of consumption at low levels, and "senior citizen rates" provide pensioners on fixed incomes with low-cost energy. These are often used to alleviate the social cost of raising energy prices to the low-income population. Lifeline pricing is administered by the utilities, which provide discounted prices to consumers for a single "needed" block of energy while charging full price for any consumption over and above the limited lifeline block. There are both advantages and disadvantages of the system. While it is simple to administer and at the same time makes the tariff socially sensitive, it also involves "leakages". It fails to differentiate between the poor and the non-poor, who is still subsidized. Alternative solutions that try to target lifeline price subsidies based on means-testing (or other targeting mechanisms) would clearly be administratively more complex. For example, the block rate could be given

¹⁵ Caroline L. Freund and Christine I. Wallich, "Raising Household Energy Prices in Poland : Who Gains? Who Loses?", Policy Research Working Paper 1495, The World Bank, Europe and Central Asia, Country Department II, Office of the Director, August 1995.

only to the "certified poor". This however involves identifying the target customer and then incorporating the above subsidy in the bills, which might not be very cost effective. Finally, providing lifeline rates (unless the utility receives compensation from the budget) implies a cost to the utility that will affect the utility's cost recovery. To avoid this problem, the energy tariff on consumption after the first block could be set above the long run marginal cost so that the average price to consumers of large quantities is roughly the efficient price. Multiple block rates with a "lowest" lifeline rate and a "lower" rate for the next increment in consumption can be used to protect both poor and middle income consumers from the effects of price increases. They are, however, more administratively complex than single block rates and involve greater leakages, larger subsidy costs, and less incentive to conserve. However it is believed that lifeline rates implemented in this fashion should redistribute income. But before adopting such a scheme to redistribute income, regulators should consider how eligible customers value the subsidies they receive; what distortions and equity efforts are created, and how the costs of lifeline pricing compare to costs of other distributive programs (Scott 1981).

Vouchers, which could be administered by government or local social assistance offices, could be given to the certified poor following price increases. These vouchers would entitle them to the purchase of a certain amount of energy at a fixed price. In principle, vouchers allow some differentiation between households based on size and composition vis-a-vis the block rates (the block rate would apply to the "billing address" regardless of how many consumers were present). However, the administrative hurdle in case of issuing voucher, is identifying the eligible consumer group.

In a growing economy, a voucher system is clearly more administratively cumbersome, since in most cases no prior social benefit scheme is in place. Hence no reliable database is available for identifying the target category. Like lifeline rates, targeted vouchers interfere with allocative efficiency, they impede the operation of the substitution effect, as it makes the system price insensitive. In addition, trade in vouchers could raise a whole new set of issues. Under such circumstances the non-poor who buy the vouchers would also benefit from the cheaper energy (although of course they would pay for the voucher). However, unlike the block rates, the units that can be consumed are restricted. Moreover if the vouchers programme is properly designed the utility is compensated for all the units of under priced energy through budget.

Targeted cash payments provided to the eligible poor through the social assistance system would not only avoid leakage but also take care of wastage of energy, since the poor consumers face market prices. They also protect the utilities' cash flows." Targeted specific cash payments could be given to "at risk" groups through the social assistance system, while at the same time the market forces could move the energy prices to efficient levels. In Bulgaria, for example, a scheme is in place to compensate poor households for higher electricity prices. Under the Bulgarian approach, households are grouped into three categories, by income, and a predetermined subsidy (transfer) is paid to each group of households; the subsidy declines, as income goes up.

Providing the cash compensation for energy price rises by increasing some guaranteed minimum levels of income could be another approach, where the social assistance payment is indexed to energy prices. However, the crucial decision factor is the amount of compensation to be offered. If the mechanism is not implemented with caution, the

process could be expensive.

On the other hand in *Targeted transfers in-kind* the social assistance office pays the power bill of the established poor consumers directly to utilities. The target beneficiary never sees the money. Thus, the transfer cannot be used for anything else and is thus analogous to giving a given quantity of electricity to each target beneficiary for free.

The basis of this payment could either be the net or gross income of the recipient. A pre-determined poverty line could be the benchmark of deciding the target segment, vis-à-vis the actual level of incomes of the individual. In case of availability of metering facility, gross income would be preferable basis as varying the metered usage can vary net income. On the other hand for non-metered individuals/households, the net income can be the basis of compensation.

Another available option is increase in *general wage or pension* or in unemployment benefits or other fixed incomes across-the-board. However this would have an inflationary impact, as it would increase the burden on budgetary allocation. Moreover this would benefit all consumers, not only the poor, thereby increasing leakage. On the positive side, this approach allows the price mechanism to work, and does not interfere with the finances of the utility. In case of sudden high tariff increase it might be politically necessary to implement such a rise. But any compensation should take a one-time-only form and be specifically targeted to at-risk groups.

Analysing all the above schemes one could conclude that the cash payments to at risk groups are probably the preferred compensation scheme. They are targeted, fiscally narrow, allocatively efficient, and, since they are financed by the budget they are not financially harmful to the utilities. Whatever the approach, the choice should be based on the current social assistance system and on future social assistance policies, and should be coordinated with energy sector objectives. A lifeline rate with a single block may be preferable if social assistance targeting is sufficiently weak. And, it could be phased out over time by shrinking the block. It must be kept in mind that the need for social assistance in turn is affected by the method of price compensation chosen. If targeting through subsidized energy pricing is introduced, then this should be factored into the level of social assistance.

In conclusion

The South Asian region poses a particularly challenging situation to the newly formed independent regulatory commissions due to the large percentage of the under-privileged populace as well as the tariff distortions that have led to poor financial health of the electricity sector in the region. As such, while it has been pointed out in this paper that special considerations are given to the poor and disadvantaged even in countries like the USA and UK, the magnitude of the problem in this region challenges the regulatory commissions manifold. One of the major challenges in protecting the interests of the under-privileged in South Asia would be to develop fail-proof methods of identifying the target population. This challenge immediately brings into focus, for the countries of the region, to define their own unique system of caring for their under-privileged.

Most importantly, however, neither the Governments nor the Regulatory Commissions in these countries need to fight shy of recognising the need to provide special considerations

(including subsidies) to well targeted populations. However, they would have to work together towards defining mechanism that would deliver desired results. As far as the under-privileged are concerned the Regulatory Commissions and the Government should reconcile themselves to a greater interventionist role till the time that the general shortages in the system are reduced and competition results in an actual lowering of prices.

Cross subsidies, as we have traditionally known them to be, may be a necessary part of the evolution of the electricity industry. Pricing of electricity, as anywhere else in the world, will remain a political issue as well as a moral responsibility. Regulatory commissions would have to design innovative pricing techniques that may represent the opportunity cost of supplying electricity to the EHT/HT consumers, thereby enabling the levy of a lower tariff to the agricultural and domestic consumers while ensuring an adequate return to the industry. In other words, a combination of opportunity cost based tariff setting (with a time-of-use differentiation) and cost based tariff setting may ease the required effort towards a rebalancing of tariffs.

Also, in addition to focussing their attention towards dealing with the issue of subsidies, a greater effort needs to be directed towards more practicable corrections. These would include measures such as containing thefts, a higher degree of accountability at various functional levels, putting in place systems and procedures for gathering data and undertaking analyses that would facilitate a less painful transition towards rational pricing, amongst others.

Equally important is the need to educate all consumers, and specially the under-privileged, of their rights to be customers of distribution companies and of the services that they are entitled to. The Regulators should proactively encourage the representation of this group of customers in the public hearings organised by them on various issues.

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Issues in tariff/pricing: future directions for regulation of India's infrastructure sectors

Transition to a liberalized environment: experiences and issues in regulation 54-62

Issues in pricing

The process of setting tariffs and their regulation is governed by a number of considerations, which can be established on the basis of experience in various countries. Prices have to be determined on a forward-looking and dynamic basis, and they have to fulfil the objectives of efficiency and equity. Prices must be such that they promote innovation and competition, and ultimately lead to the welfare of the consumer, as was the case in the UK. And, to ensure efficiency of natural resource use through pricing and the signals that it provides, environmental effects and other externalities need to be internalized. Regulators in India have several options in adopting the principles that apply to tariff setting, and some of these are explored later in this paper.

Defining an evolutionary process

The structure of the industry and prevailing market conditions are an important determinant of the kind of framework that would be most effective in the regulation of India's infrastructure sectors. As analysed elsewhere in this volume, there is apparently a lack of common design in the establishment of various regulatory bodies in the country dealing with different sectors of the economy. This is not to say that identical structures are essential for each sector of the economy because clearly market conditions and the very character of the sector would determine the nature of regulation and regulatory bodies across industries and sectors. With the introduction of independent regulation, it is hoped that a process of evolution would be set in that would not only change market conditions but the very structure of the industry, particularly in respect of bringing in competition. Ideally, an effective process of regulation should lead to the mimicking of perfect competition in industries or sectors that would exhibit monopolistic powers in the absence of regulation. Consequently, it is understandable that different sectors of the economy in India support different types of regulation, but the ultimate destination of the evolutionary process should have some commonality and consistency. Considering the important differences between the specific characteristics of different

sectors that are being regulated, we need to carry out a quick assessment of the status of the particular industry that is being regulated. Based on the assessment, we would need to come up with a path that defines the evolutionary process to be pursued. This is not necessarily something that has to be done formally, but at least the regulatory bodies responsible for specific decisions need to have some kind of a road map on the basis of which they would move ahead. Setting up regulatory bodies and ensuring their efficient functioning are part of the evolutionary process, and this may necessitate certain legislative and administrative actions as we go along. Undoubtedly the legislation currently existing in India is not satisfactory in all respects, and some amendments will be required to make this process effective. As far as consumer interest is concerned, we would progressively need to bring in a certain level of competition that actually ensures consumer welfare.

The US experience

The US experience in the electricity supply industry has been quite remarkable in the past few years. Two and a half decades ago, regulatory issues in the US had a set pattern – there was an established basis at that time because demand was growing steadily and economies of scale and technological change were bringing about improvements in the efficiency of operation. Because of this, there was a decline in the real cost of electricity. Regulatory challenges at that point of time were rather simple and the US followed a very simple rate of return form of regulation which was accepted by most state regulatory commissions and even at the federal level. But changes over the past two decades or so have led to growing competition and there is now an emerging market for power which has several players as can be seen in Figure 1. In 1997 there were 131 players involved in the marketing of electric power. The industry's top ten players reportedly account for the bulk of the business of power marketing, in terms of the volume of transactions handled. But this too would depend on a process of evolution, such that over time the volume of trade handled by the bigger organizations would reduce in size. The volume of trade according to Sioshansi and Altman (1998) is however not an accurate indicator of business profitability.

The UK experience

The UK experience differs substantially from the history and experience of the US. Notably, British regulatory policy has also been based on price cap regulation. The path that rate of return follows under this system is shown in Figure 2. Essentially, returns to shareholders increase immediately following

Figure 1 Growth of power marketers in the US, 1993-97
Source Sioshansi and Altman (1998)

the establishment of a price cap as a result of efficiency improvements and cost reduction. When the next regulatory review is held, the price cap would be reset leading to a reduction of the rate of return, but the same process follows between regulatory review periods. Of course, the potential for efficiency gains and cost reductions would reduce over time as the slack in the organization is eliminated after the fat inherited from state ownership vanishes. Yet, this does not eliminate the benefits of technological change and innovative methods of production, which could conceivably lead to periods of higher profit. In terms of the price paid by the

Figure 2 The relationship between the price cap and supernormal returns
Source Parker (1997)

consumer, the UK experience has been generally positive, with benefits ultimately flowing to the consumer.

It is difficult to say which system would lead to greater consumer benefits, because in the US, growth in the size of the market and the introduction of new technologies have made competition highly feasible in recent years. The regulatory systems in place, however, were designed during a period when market growth and technological change were relatively steady and predictable. With increased competition, understandably there is now much greater pressure for deregulation in the US and for ushering in a period of necessary regulatory reform. In the case of telecommunications, market growth and technological change have been taking place at a phenomenally high rate. Also, the intercity market has grown far more rapidly than the local market. This has, in recent years, led to some organizations reaching almost a level of monopolistic power, necessitating changes in regulation for bringing in competition. It is possible that something similar may happen in the UK as well, once the initial period of regulatory change has been gone through.

Rate of return versus price caps

There is now a great deal of discussion and debate on the basic principles of pricing that should guide regulatory decisions. On the one hand, there is the use of conventional rate of return methods and on the other, there is the practice of imposition of price caps. Because of its simplicity and the fact that it is an established practice, the rate of return regulation is somewhat better accepted than price caps. Price caps are relatively recent and they raise a large number of questions regarding why a particular cap has been set. But there are those who strongly support the price cap approach. To quote Sir Christopher Chataway (1995), it is not so much the issue of price caps but the accompanying privatization that forces the implementation of efficiency measures, which in turn leads to large-scale reduction of the labour force, that makes it the subject of so much criticism. This has been the experience in the UK, and will likely be the experience in India. Discussing the rate of return regulation versus the price cap approach followed in the UK, Chataway (1995) quotes the example of the British Airports Authority, and agrees with the popular view that the system of economic regulation adopted in Britain does give an opportunity for high profits. As opposed to this, the US rate of return regulation sets a maximum on this variable, and any excess has to be passed on immediately to the customer in the form of price reductions. After reducing price by an average of six per cent in real terms

each year, the British Airports Authority as regulated by the Civil Aviation Authority is not required to pass on to the customer any of the gains from efficiency improvements. He lists some of the merits of the UK system as the avoidance of what is generally referred to as gold plating in the US. The British system of RPI-x will, of course, over time tend towards the rate of return regulation level; but it is perhaps an effective way of bringing about quick price reduction and efficiency gains, given the history of government ownership of the infrastructure sectors.

Incentives for new investments and innovation

Pricing has to provide incentives for new investments and innovation. A policy that allows somewhat unacceptable levels of profits initially is not necessarily bad because it provides an incentive for investors to come in and it is only when the gains of competition start coming into the system that consumers start to benefit. As Prof. Littlechild pointed out, consumers in the UK have benefited enormously over a period of time. This may not be very apparent in the short run. But if you give the whole process a reasonable amount of time, the overall impacts are bound to be beneficial to the consumer. Therefore, in India, we are on a steep learning curve as far as price regulation is concerned. Because we have this enormous challenge of attracting new investments, we have to bring about improvements in the efficiency of several of our infrastructure sectors that are functioning very inefficiently. Therefore, while one could allow the luxury of waiting to learn slowly and then making regulation effective, one would probably lose out on opportunities which have a very high cost in terms of unrealized economic growth and development. It is vitally important that we chart out a clear road map and move along that rather quickly.

Integrated resource planning

In the case of electricity, but perhaps not applicable equally to other infrastructure sectors, regulatory decisions have to look at possibilities of integrated resource planning. And this is particularly so in a system that has very high inefficiencies. If new investment is to be made, one needs to look at opportunities across the board and see where that particular investment is most effective – in new capacity for generation, or improving transmission and distribution systems, or improving the efficiency of use at the consumers' end. Ideally, integrated resource planning has to be evaluated with the assistance of a suitable quantitative model in which the benefits from each increment of expenditure can be evaluated for

different stages of the production and distribution cycle. Prioritization of resource allocation can then be arrived at on a rational and precise basis.

Matching regulation with public policy experience

It is also important to remember that we have to match restructuring regulation with public policy experience. In this context, we need to look at the experience of PURPA (Public Utilities Regulatory Policy Act) in the US (Perl 1997), which aimed to allow decentralized renewable energy cogeneration and other such opportunities to be able to provide power to the grid. PURPA was essentially brought in through pressure from the growing independent power industry, environmentalists, and, of course, those who wanted to exploit newer technologies that appeared on the horizon for smaller, decentralized, and diverse forms of energy production. Regulators responded to this legislation by allowing independent power producers and others long-term contracts, so that these projects could obtain appropriate financing. It worked on the principle which ensures that whoever is making the investments and is supplying the power is paid at a price which reflects the avoided cost of power that would have been generated if this particular option had not been exercised. The problem with the principle is that the avoided cost can vary over time and it is very difficult to predict how this might change. Therefore, investors and particularly financial institutions were not willing to provide the kind of investment that was required to make the best use of this particular opportunity. So, regulators stepped in to ensure that the contract that was given for pricing of power supplied either from, let us say, wind energy generators or cogeneration in industrial plants was of a sufficiently long duration. So, this was really an initiative taken by the regulators in the interpretation of a policy and this was not provided for in the Act itself. Therefore, efficient regulation in a sense should mimic what would happen in a perfectly competitive and market-friendly environment.

Assessing the regulatory assets base

Getting into the nitty-gritty of pricing, one area beset with serious doubts and questions is the assessment of the regulatory assets base. Essentially when privatization takes place, one has to arrive at an estimate of the assets of privatization. This is reflected in pricing decisions as well. To quote an example taken from the literature, if you were to set up a combined cycle power plant with 48% efficiency of conversion, and if the efficiency of the plant that is available four or

five years later goes up to 53%, the corresponding loss of value in terms of assets of the earlier plant will be much higher than the depreciation that actually takes place. If there is such a rapid depletion in the value of the assets, then those who have borrowed in order to invest in that asset may not be in a position to pay back the full amounts that have been borrowed. Therefore, one would have to build in some kind of a risk premium that somehow insulates the investor from the risk that would take place (Newbery 1997). The extent and possibility of risk would depend on the kind of technology or infrastructure one is dealing with; for example, in the computer business obsolescence is taking place at a rapid rate, and this needs to be anticipated in terms of the financial risk involved.

Dealing with inefficiency and surplus labour

Other issues not peculiar to India, but particularly severe in India, are inefficiency and surplus employment. Bringing about efficiency gains and passing the benefits on to consumers raise the question of how best to deal with the enormous problem of surplus labour. How this transition is brought about becomes an important issue of strategy that must be embedded in pricing decisions. Undoubtedly, there are no clear-cut answers and there will be enormous conflicts between different players and different stakeholders. But this is an issue that will be important in the case of India. I suspect the most difficult issue facing the privatization of the distribution end of the power sector, about which there has been talk for some time but no tangible results except in Orissa, is the question of surplus labour. A great deal of intellectual effort and consensus building will have to go into dealing with this problem.

Regulation of prices versus environmental standards

By and large, in most countries environmental standards are laid down by federal agencies, whereas regulation of prices takes place on a decentralized basis. This is typically so in the US and will be the case in India too. While the price regulator is not necessarily involved in setting environmental standards, there could be some conflict between the two. Here again, environmental standards are likely to change over a period of time and prices will have to reflect to some extent the internalized cost of future changes that would come about. Very often, the plant or equipment itself will have investments that ensure a perceived environmental requirement that will have to be met in the future. So in some sense, investors are buying certain levels of risk. And we have seen the enormous change that has taken place in this country.

One of the biggest challenges that regulators in India would face relates to the inclusion of environmental standards. There are two divergent pressures that would be brought to bear on them in such decisions. The first set of pressures would come from the industry itself that views environmental compliance as an unnecessary and expensive luxury. On the other hand, environmentalists would take a totally different view requiring strict and rigid enforcement of environmental standards on producers of regulated services. One estimate for the US indicates that two per cent of the gross national product is the cost of complying with environmental regulations for the economy as a whole. In the case of the electric power sector existing regulations could add 10% or higher in the cost of constructing a power plant, as well as increasing operating costs (Andrews and Govil 1995). Regulators will have a difficult task of estimating externalities for the environment, and internalizing them as part of the price to be paid by consumers. This would also lead to conflicts between state and central regulators as has been the case in the US. In general, state level regulators were somewhat lax in enforcing environmental compliance, and much of the pressure in recent years has come from the federal laws and regulations.

Conclusion

Essentially, we need to chart out a clear path on how evolution will take place with regulatory measures in this country. As part of this, we not only have to lay down certain methodologies and processes but will also have to think in terms of the enhanced powers, the sharpening of actions, that will take place as a result of legislative action. We have made a beginning, but there is enormous disparity between the different regulatory bodies and perhaps each one of them will move at a different pace at different stages. But we need some kind of a common framework for all of them, and more importantly we need a very specific trajectory of change in the evolutionary process that each particular sector will have to follow in the years ahead.

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Analysis of regulatory processes and decisions

The last 5 years have witnessed dramatic changes in the style of governance in some of the infrastructure sectors in India. This change has taken place against the backdrop of the continuing efforts of the government to bring about a greater role for the private sector in areas which were hitherto a public sector monopoly. The private sector has been seen as an answer to the inadequate performance of the infrastructure sectors, both in terms of increasing supply and in terms of quality of service and better customer satisfaction.

To do this, several steps had to be taken by the government, the most important of which were to divest itself of certain functions and to establish independent regulatory commissions to undertake these tasks. The first commission to be established under this new style of governance was the regulatory commission for electricity in Orissa. This was followed by the regulatory authority for the telecom sector in 1997. In the same year, through an amendment of the Indian Ports Act, 1908 and the Major Port Trusts Act, 1963, TAMP (Tariff Authority for Major Ports) was constituted. In 1998, the CERC (Central Electricity Regulatory Commission) was established and subsequently a number of states have set up electricity regulatory commissions. These have been established either under state-specific legislation or under the umbrella of the Electricity Regulatory Commissions Act, 1998.

The purpose of this paper is to examine the process of decision-making that has been adopted by these new institutions. The process of decision-making is important, both in terms of gaining support and establishing credibility, and in terms of improving the quality of decision-making. This paper examines the trends in various sectors and suggests the direction in which the decision-making process should evolve in future.

The sectors taken up for study and analysis are telecom, ports, and electricity. In the case of electricity, both the central commission and the state commissions would be discussed. There are considerable differences in the scope of the various commissions—in the ports sector, the scope is narrow, being only tariff, while in the other sectors the scope is broad. However, it is worthwhile to discuss all of them together to understand the decision-making process and to

put together the different experiences. The paper is divided into four broad sections

1. Provisions in the legislation on decision-making process.
2. Provisions in the regulations of the individual bodies on the decision-making process.
3. Description of decision-making process with reference to the individual orders of the regulators.
4. Conclusions regarding trends and directions for further change.

Legislative provisions

Telecom

The TRAI (Telecom Regulatory Authority of India) was established by an Act in 1997. Section 11 (4) of the Act reads as follows

- A) The Authority shall ensure transparency while exercising its powers and discharging its functions.

The Act also provided that under Chapter IV, for settlement of disputes, TRAI should be guided by the principles of natural justice and that the authority would have the same powers as are vested in a civil court, under the code of Civil Procedure, 1908 in certain matters. All proceedings under this chapter were deemed to be judicial proceedings, within the meaning of Sections 193 and 228. The Act also had provisions for appeal against any decision or order of the TRAI to the high court.

Thus it may be seen that the Act has a specific provision for ensuring transparency; the legislation itself imposes a broad principle on TRAI in terms of its decision-making process. The Act also has a specific provision for appeal to the courts. The Act was amended in 2000, which has made some changes in the decision-making process. The power to adjudicate disputes has been taken away from TRAI and has been given to the Telecom Disputes Settlement and Appellate Tribunal. The appellate tribunal has also been given powers under the Civil Procedure Code. More important, the appeal against the orders of TRAI would now lie with the appellate tribunal and not with the high court. Appeals against the orders of the appellate tribunal lie with the Supreme Court. Further, TRAI's powers of a civil court for settlement of disputes have been given to the appellate tribunal. Similarly, the proceedings of TRAI were earlier deemed to be judicial proceedings; now only the appellate tribunal's proceedings are deemed to be judicial proceedings. Thus the amendment has reduced the scope of TRAI and judicial review, but has otherwise left the decision-making process largely unchanged.

Ports

TAMP was established under an amendment to the Indian Ports Act, 1908 and the Major Port Trusts Act, 1963. The amendment does not have any specific provision on the decision-making process. The amendment, however, gives TAMP the freedom to make regulations, which would inter alia cover the procedure for transaction of business. TAMP has issued guidelines regarding its procedure, which are discussed later.

Electricity

The Electricity Regulatory Commissions Act, 1998, specifies in Section 37 that the commissions shall ensure transparency while exercising their powers and discharging their functions. Thus the CERC and those states that have established regulatory commissions under the provision of this Act are bound to follow procedures that ensure transparency. As has been explained earlier, there are some states that have established regulatory commissions under state-specific legislation. In Orissa, Section 9(6) of the Orissa Electricity Reform Act, 1995 reads as follows

"All decisions, directions and orders of the Commission shall be supported by reasons and the decisions, directions and orders of the Commission shall be available for inspection by any person and copies of the same shall also be made available to such person in the manner prescribed by regulations".

Section 9 (7) of the Haryana Act has a similar provision. Both these Acts also prescribe that all proceedings before the commission shall be deemed to be judicial proceedings, within the meaning of Sections 193, 219, and 228 of the Indian Penal Code, and the commission shall be deemed to be a civil court for the purposes of Section 195 and Chapter XXVI. There is a similar provision in the Electricity Regulatory Commissions Act, 1998. All the Acts give the commission the freedom to prescribe their regulations.

Thus it may be seen that in the electricity sector there are provisions in the legislation to bring about a certain degree of transparency. However, the Acts also have restricted the commissions in terms of their procedure by specifying that the proceedings shall be deemed to be judicial proceedings. There is some freedom given to the commissions to evolve their own procedure and to frame regulations.

Provisions in regulations

TRAI has not issued any regulations regarding its general procedure. It has issued regulations on the quality of service and matters relating to

interconnection agreements. TAMP has issued guidelines (formal issue of regulations as contemplated in the Act have been held up because of some administrative problems) regarding the transaction of business in 1998. According to Section 21 of these guidelines, a consultative process shall preponderate the procedure adopted by TAMP to process the case or proposal so as to promote the greatest participation of the greatest number of interested parties.

It may be recalled that the TRAI Act had provisions making it mandatory for transparency to be ensured while the TAMP Act does not have any such provisions. This lack in the statute has been made good in the case of TAMP by providing for a consultative process in its conduct of business guidelines. Although TAMP has not been able to issue its statutory Regulations the guidelines and the actual procedure adopted has ensured transparency.

In the electricity sector, there are provisions in the statutes to enforce transparency. Therefore, the regulations only have provisions that would complement these statutory provisions. Thus in the regulations issued by the CERC, there is a provision for publication of a petition—this is to be done only in those cases where the commission so directs. There are similar provisions in individual state regulations also.

It may thus be seen that either through the legislation itself or through the regulations, there are provisions to ensure transparency. Since there are provisions for judicial review, there is a mechanism to enforce these provisions of transparency. Thus if a regulator were to act in a manner contradictory to the statutory provisions or to the regulations prescribed by the regulator itself, there is a clear scope for appeal to the judiciary and to get the order set aside on the grounds that there has been a breach of the law or the statutory regulations.

Discussion of orders

Against this legal and formal background, this section examines individual sectors to see how these provisions have been interpreted and practiced in the disposal of individual matters by the regulators.

Telecom Regulatory Authority of India

TRAI has been following a consultative process in arriving at final decisions. It has so far issued consultation papers on 14 subjects. Perhaps the most important of these is the consultation paper on tariffs. There were two such consultation papers, the second of which was issued in 1998. This paper gives details of the industry and touches on how the authority proposes to make changes in the existing structure and level of tariffs.

The consultation paper on the quality of service gives details of the parameters on which service quality would be monitored. It also gives precise standards that the industry was expected to achieve at various levels. Although this consultation paper was issued in 1998, the final order was issued only in July 2000. The order does not make it clear as to how the consultation document was processed further. Thus it is not clear whether the operators or consumer organizations had reservations on the proposals of the regulator or whether there were any objections. The final order is also not a speaking order, in the sense that the basis for fixing the various quality of service standards have not been spelt out.

This is the first order in the telecom sector, in India, on quality of service standards and therefore it is an extremely important document. Surprisingly, for a document of such importance, it has not received the kind of attention and publicity that it should.

TRAI had also passed judgements in a number of cases—essentially disputes raised by private operators against the Government of India. In these cases, the process has been more judicial than consultative.

Tariff Authority for Major Ports

As has been brought out earlier, TAMP had in its guidelines prescribed a consultative process. By its very nature, TAMP can only issue orders on matters relating to tariff. A perusal of the tariff orders shows that TAMP has been extending its consultation over a wide area. Although its headquarters are in New Delhi, it has been moving to various locations and ports, in respect of which orders have been issued.

The procedure that TAMP has been following is that on receipt of a proposal for fixation of tariff, it circulates these to the main users / representative bodies of users of the port. Apart from the written comments that the users give, a joint hearing is also held. During the process of the joint hearing, certain issues do come up, requiring consultation between the users and the service provider. This could lead to a further amendment in the proposal. Thereafter, TAMP discusses the important issues and gives its orders on them. It also takes note of the agreements reached between the service providers and the users. In a few cases, TAMP has issued orders of a general nature—orders that are applicable to all ports. In these case, the orders reached in a previous case have been extended to all the ports.

Electricity

In the electricity sector, the general approach of the regulatory decision-making process has been similar to a judicial process. The normal procedure is for petitions to be filed and then served on those who are likely to be affected by the grant of the request in the petition. Except in the case of tariff or some other major cases, the petitions are not published and therefore the scope for consultation is reduced. As there are a large number of petitions, and it would be time consuming to have every proposal published, this procedure of selective publication of proposals is being followed. Of course, even when the proposals are not published, opportunity is given to those who are likely to be affected by it. Moreover, in many cases, the petitions and the schedule of hearings are placed on the web site of the concerned regulatory commission.

By its very nature, the CERC is on a different footing compared to the state regulatory commissions and the other central commissions. The CERC does not have to deal directly with the consumers as the central utilities sell primarily to the state-level organizations. Of course, the decisions have a bearing on the final price that the consumer has to bear. Since the state-level organizations are the intermediaries between the CPSUs (Central Public Sector Undertakings) and the consumers, it is expected that the state organizations would represent the consumers. Therefore, even if a petition is sent to the state-level organizations, there is an effective consultation process. The CERC and the SERCs (State Electricity Regulatory Commissions) have been following a similar procedure of initiating action only on the basis of a petition for a specific proposal. There are important exceptions to this procedure.

In the case of CERC, suo motto action had been taken by the commission to revise the norms of operation. The new norms proposed by the CEA (Central Electricity Authority) had been circulated for comments. On the basis of these, the commission expects to pass final orders regarding the revision of the norms for operation, which had been fixed in 1992. The revision of these norms would effect the tariff and the conditions for supply of electricity by National Thermal Power Corporation / National Hydro Power Corporation to the States.

Similarly, suo motto action has been taken by some SERCs to define the procedure for captive power applications or on any specific action where it feels the utility is not proceeding in a correct manner.

In the main focus of work – fixation of tariff – action starts with a formal filing of the annual revenue requirement and tariff proposals. Public notices are issued, objections invited from the public, public hearings held and a final order issued. Thus all the stakeholders are given an opportunity to air their

views and a fairly widespread process of consultation is achieved as is reflected in the orders. However, in several of the non-tariff orders, it is not apparent from the orders as to what had been the process of consultation. Thus, in the case of the captive policy documents it is not clear as to what had been the process of consultation, what were the views of the different stakeholders, and the considerations that led the commission to issue the final document. It is also not clear as to what is the general approach of the commission on the issue and this can only be gleaned from the individual orders. It is also seen that in the electricity sector there has been a fair degree of legal representation before the commissions, specially in orders on individual cases, there has been greater discussion of the legal aspects of a case and less of the other aspects, notably the development of the sector.

Analysis and conclusion

It may be seen that the approach in the three sectors has been quite different. In the telecom sector, the approach has been largely consultative, with TRAI initiating action and formulating general policies. In the electricity sector, the approach has been more of a judicial kind with the process being initiated generally by a petition, which is sent to the various stakeholders as respondents and a final decision is taken after hearing all parties. In the port sector, there is a mix of both the approaches, with a fair number of orders being issued on the basis of the petition; but a consultative process is gone through before TAMP passes orders on the points of difference that may still remain. In a few cases, TAMP has acted pro-actively and issued general orders covering all the ports. It has not so far attempted a consultation paper on issues common to all the ports.

Transparency in the regulators' orders

Despite the differences, there is a clear affirmation of the principle of transparency in all the sectors. Generally speaking, the orders are detailed and discuss the viewpoints of the various stakeholders. This is clearly a big gain as compared to the system prevailing prior to introduction of reforms and regulators. This movement towards transparency, has meant, among other things, a closer attention to the information being supplied by the service providers and a better estimation of important parameters like T&D (Transmission and Distribution) losses in the electricity sector.

However, transparency by itself will not be able to produce the desired results. The regulators today have a very difficult task to perform—they have to

simultaneously ensure that growth takes place and the supply bottlenecks are eased and create a climate conducive for more competition, efficiency, and better service to consumers. Short-term imperatives clash with long-term interests. Producers and consumers have got accustomed to a particular line of treatment and these are difficult to change. In these difficult circumstances the regulator has to play the role of a bridge between the interests of the producers and the consumers and between the public sector and the private sector. It also has to prod the government to take the policy steps crucial for complementing the efforts of the regulator to improve growth, efficiency, and equity.

Approach to consultation

The process of consultation if done in a less formal manner can help bring about improvements in the climate for change. Consultation has several objectives and advantages. Firstly, the more wider the consultation, the better the information base. Secondly, wider consultation gives alternative viewpoints and thus offers the regulator a wider choice of options in arriving at a solution. Both these objectives can be met through a formal judicial process whereby applications or petitions are served on all the interested parties and they have an opportunity to comment on the information and the conclusions in the application/petition.

However, a formal process of consultation does not give much room for a narrowing of the different perceptions of different stakeholders. A more productive approach would be for the regulators to consider themselves primarily as agents of change and development. In this capacity, they should try and narrow down the differences between different stakeholders. It is only where there are un-reconciled differences that the regulator needs to pass a formal order. Such an approach would also help in establishing greater credibility and confidence in the regulator among all the stakeholders. It would also help avoid the risk of adverse positions being taken.

Experience in other countries

It would be interesting to see the process being followed in other countries. In Sri Lanka, the Committee of Inquiry on Improvement of Subscriber Bills and Resolution of Billing Related Disputes in the fixed-access telecommunication sector issued a call for submissions from the public. The committee received over 450 written submissions. Out of these, over 40 members were invited to elaborate upon their submissions in person before the committee. The operators were invited to respond to the submissions at the conclusion of the

hearings. After considering the information, the committee formulated and distributed a set of issues to the operators. Hearings were conducted again during which evidence was heard from experts in billing and billing-related disputes. The operators were again invited to present their positions at the conclusion of these hearings. Thus, a fairly wide process of consultation was followed by the committee before issuing its final order.

The OECD (Organization for Economic Co-operation and Development) had commissioned a report on regulatory reforms. One of the findings in the report is a strong trend towards renewal and expansion of public consultations in regulatory development in OECD countries. The report distinguishes between two broad objectives of consultation

1. In some countries the objective is primarily consensus building and balancing of competing interest.
2. In other countries, the emphasis has been on provision of empirical information to allow for efficient decision-making processes.

Apart from formal consultation, there is informal consultation, which is systematically used in United Kingdom and Japan.

In the short term, the process of consultation may be seen to be somewhat time consuming and cumbersome. There are, however, advantages in this methodology, as is reflected in its growing acceptance in other parts of the world. In the long run, a systematic policy of consultation will yield considerable benefits.

Consultation and consensus building

In India, it would be useful to combine these two approaches and use consultation not only for getting better information but also to forge a consensus on as many issues as possible. One way of doing this is for the regulators to issue a draft paper or order on a specific proposal. This would give the different groups an insight into the thinking of the regulator and an opportunity to narrow down differences. Such a process would also indicate the willingness of the regulator to accept corrections and would help to bridge the gap between the regulator and other stakeholders which might persist in a more formal approach. In addition, this approach would also have the advantage of there being fewer opportunities for judicial review. Given the time taken for the judicial process to complete itself, there are obvious disadvantages in a system in which a large number of cases end up in judicial courts. Apart from the delays that this process must inevitably lead to, there is also the uncertainty factor, which is

important and which is likely to delay the entry of private capital. Moreover, since the judicial process takes time there is a tendency for the status quo to be maintained in the form of stay orders. In a scenario where change is the key to further development, this is clearly in nobody's interest, either the producer or the consumer.

It is therefore suggested that to have a greater and more meaningful consultation, regulators should, at least on major policies that affect the industry as a whole, try and reach consensus on as many issues as possible before exercising their statutory powers of issuing and enforcing orders. It is also seen that in disposing of a particular matter there are issues which affect the whole industry. Thus issues relating to captive power plants and third-party sales arise in specific cases but have a bearing on the sector as a whole. In such cases, there should be a wider consultation and this should not be restricted to the parties before the commission. Again, on these major decisions the commission should in some form inform the various interest groups of the likely course of action that it proposes to follow, including the issue of a draft order. These procedural changes can be made within the statutory framework as it exists and there is no need for any legislation. At this stage it would be better to leave the individual commissions to evolve their decision-making process in this direction. It is only after a few years when greater experience has been gained that the question of revision of the existing laws needs to be taken up.

Regulator as agent of change

Such a process of decision-making has certain connotations for the very role of

such a process of decision making has certain connotations for the very role of the regulator. The regulators have two faces. On the one hand, they have certain statutory powers that they have to exercise in settling disputes or in passing orders on the various functions assigned to them. The other is their developmental role, as defined in the various Acts. They have to promote growth, efficiency, and competition. It is this developmental role which needs to be given primacy. The regulator has therefore to be seen as primarily an agent of change and development. This cannot be done by a process which is primarily judicial in its approach. A more participative process, in which the regulator tries to bridge the gap between the various stakeholders and keeps the focus on solving the problems of the development of the sector, is likely to yield better results. In this process, use would have to be made of the media to ensure that the people at large understand what is being done. Finally, the government would have to be taken along as there are several areas where it is only the government that can initiate action and the regulator can only advise.

The process of consultation needs to be carried further, beyond the stage of passing orders. The impact of these orders and its implications for the further steps required to be taken also need to be discussed through an equally broad-based consultative process.

Such a wide consultative process with the primary focus on development can bring in rich dividends in making the decisions of the regulators more acceptable and effective, which in turn can speed up the process of growth and increase efficiency of these sectors.

Tariff Setting in the Electric Power Sector

Base paper on Indian Case Study

Introduction

Tariff setting is a primary instrument of economic regulation. Tariff provides economic signals, which determine the volume and nature of demand and supply. It is not surprising therefore that a considerable portion of the reform effort is expended on rationalizing tariffs, often disproportionately so¹. It is attractive to assume that the financial viability of the distribution business can be improved merely through technical corrections to the design and the level of tariff. The experience shows otherwise. Regulatory Commissions have been constrained from more efficient tariff setting due to the non responsiveness of public utilities to economic signals, continued poor quality, high cost and inefficiency of supply. Tariff reform can improve allocative efficiency by providing better price signals. It can increase the revenue inflow in those consumer classes where costs are currently under recovered. However, by implication, tariff reform will reduce the revenue inflow, at least in the short run, in those consumer classes, which currently cross subsidize others. The net financial impact of tariff reform can therefore be ambivalent from the near term perspective and crucially dependent on appropriate sequencing. For restoring the financial viability of utilities and bridging the revenue gap, tariff reform must be accompanied by adequate financial support from the government during the transition period and speedy and efficient restructuring of utilities along the lines of corporatization, commercialization and privatization.

It is now widely accepted that regulation is only a second best alternative. It is best when it can mimic market signals. The widely held view of the efficacy of regulation is the primary source of pressure on tariff regulators to behave like an efficient market. Since the markets are efficiency oriented, rewarding efficient agents and penalizing inefficient ones, the cost of service approach in tariff regulation has evolved into a performance based approach which incentivises efficient suppliers. Since markets provide elbow room to suppliers to manage their affairs without interference the Price or Revenue Cap approach to tariff setting was a subsequent development which attempted to mirror the free play of the market. The Retail Price Index approach is the most recent evolution in this trend.

India has a long history of experience with cost of service regulation. Its experience with performance based regulation is a decade old while it has no formal experience with either the revenue cap or the price cap or the RPI minus X approach. This paper identifies the financial imperatives for reform, reviews the evolution of the legislative basis and the nature of tariff regulation, evaluates the experiences with reform, surveys the literature and international experience, highlights unresolved issues and provides options for the future.

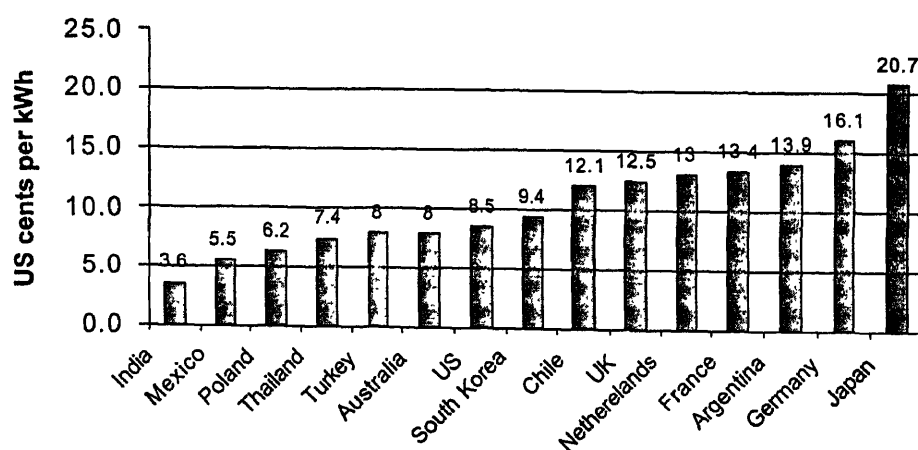
¹ Ahluwalia, Sanjeev S. "Tariff Reform in India: A review of directions and issues" in Transition to a Liberalized Environment, TERI 1999.

The financial imperative for reform²

The financial viability of the electricity business in India has worsened over time. The losses of the nineteen State Electricity SEBs (SEBs), which supply around 95 percent of electricity consumed, have increased from Rs 45.6 billion in 1993/93 to Rs 123.2 billion in 1998/99. If the opportunity cost of capital calculated at the minimum rate of 3 percent on net assets, prescribed by the Electricity (Supply) Act, 1948 [E (S) A] is added to the financial loss incurred by the SEBs, the loss in 1998/99 increases to Rs 187 billion.

High transmission and distribution loss, low utilisation of installed capacity, high manpower costs and distorted tariff are the factors contributing to the sub optimal performance. Agricultural and domestic consumers consumed nearly one half of the energy supplied in 1998/99. Both consumer categories are heavily undercharged. On an average, supply to agriculture recovered only 12 percent of the average cost of supply while supply to domestic consumers recovered only 54 percent of the average cost of supply. Conversely, supply to industry recovered 122 percent of the average cost of supply. If revenue realization is compared to the marginal cost of supply for these categories of consumers, the distortions become even more extreme. Graph 1³ below compares average electricity prices in the domestic sector across developed and developing countries.

Graph 1: Household electricity prices in 1997

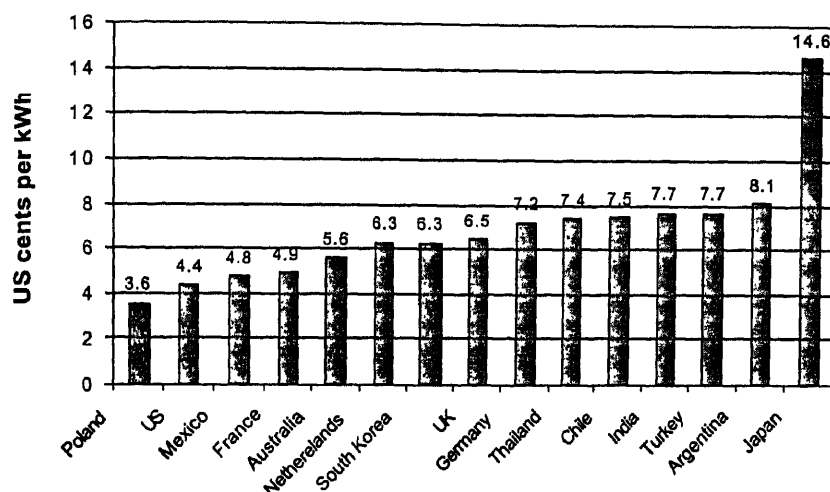


² This section borrows heavily from "The Electric Power Sector in India" a status paper, January 1999 prepared for the NCAER, New Delhi by Sanjeev S. Ahluwalia.

³ Data Source: Energy Prices and Taxes- Quarterly Statistics, IEA, 1999.

It illustrates the low average prices for household supply of electricity in India even as compared to some developing countries. Graph 2 illustrates the relatively higher prices charged to industry on average in India.

Graph 2; Electricity prices for industry 1997



Electricity prices for industry in India are higher than most developed economies, excluding Japan, and several developing countries. This distorted tariff pattern in India has been designed to cross subsidize domestic and agricultural supply by charging industry more than the average cost of supply. In most SEBs, the tariff for industry exceeds even the marginal cost of supply. This has resulted in self-generation being increasingly adopted by industry as a cheaper and more reliable source of power, thereby further eroding the financial viability of the SEBs.

The financial position of the Licensees has generally been better because they were more efficient but also because they had a limited volume of agricultural supply and were able to bill and collect revenue from their domestic consumers who were primarily in the urban areas unlike SEBs which serve a mixed load in rural and urban areas. Similarly the financial position of the central sector entities like NTPC, NHPC and POWERGRID and functionally unbundled generators, like Karnataka Power Corporation, owned by the state governments was satisfactory because they have been insulated from the financial non-viability of distribution. However, as more and more SEB's get functionally unbundled and IPPs are established, all of which want contractual guarantees, reimbursement of fixed charges and in some cases minimum off-take, the inadequate revenue generation in distribution has become a barrier for incremental capacity installation. In the case of the central sector

entities, the inadequate financial viability of the SEBs is reflected in the mounting dues, which remain unpaid by the SEBs.

SEB losses are financed from the budgets of state governments. These losses are partially offset by the receipt of subsidy from the state governments. State government finances have been under stress in the nineties. The revenue deficit of states increased from Rs 53.1 billion or 0.99 percent of GDP in 1990/91 to Rs 404.9 billion or 2.30 percent of GDP in 1998/99⁴. Relative to the total revenue receipts of the states, which is a fair indicator of the capacity of the states to subsidize the losses of the SEBs, the loss of the nineteen major SEBs increased from 5 percent of revenue receipts of the states in 1992/93 to 6.5 percent in 1998/99. If the opportunity cost of the capital invested in the assets of these nineteen SEBs is also accounted for, the loss of SEBs in 1998/99 increases to Rs 187 billion which is nearly 10 percent of the revenue receipts of state governments in that year. Since the state government finances the losses of the SEBs, financial imbalance in the SEBs has had a significant impact on the fiscal imbalance in state finances. Gujarat provides Rs 1260 crores per annum as subsidy while the allocation for power subsidy in Andhra Pradesh is Rs 1345 crores. These are resources, which the state governments are diverting from pressing requirements in the health, education and social welfare sectors. It is not surprising therefore that reform of the power sector should constitute a very major part of the more general process of economic reform and that within the power sector, attention should be focussed on tariff reform. It is however somewhat naïve to expect that tariff reform can be implemented in isolation of a change in the managerial effectiveness of public utilities or a restructuring of the industry.

Review of the Legislative provisions and trends in Tariff Setting⁵

Indian Electricity Act, 1910

The legal provisions for the regulation of tariffs of power utilities can be traced to the Indian Electricity Act 1910 (IE Act). However, in keeping with the perceptions of the times, there was no attempt at being prescriptive by specifying, either the principles, or the methodology to be followed for tariff setting, beyond enjoining that tariff must be non discriminatory and allow a reasonable return to the licensee.

Electricity (Supply) Act, 1948

The first attempt to closely regulate monopolistic power utilities by defining the basis on which tariffs could be charged was made in the Electricity (Supply) Act, 1948 [E (S) Act]. At the time there were two types of entities in the power sector; Licensees under the IE Act and State Electricity Boards (SEBs) created by the E (S) Act. Schedule VI of the E (S) Act

⁴ State Finances; A study of budgets of 1999-2000, January 2000, RBI.

⁵ This section borrows heavily from the Central Electricity Regulatory Commission (CERC), Consultation Paper on Bulk Electricity Tariffs, September 15, 1999.

prescribed the methodology to be followed for the determination of the tariffs of power utilities, which were Licensees under the IE Act. This is a detailed cost plus methodology where the rate of return on the capital invested is regulated and a cap is imposed on the clear profit of the licensee. In the case of Licensees it has worked satisfactorily from the viewpoint of financial viability of the utility. The E (S) Act also established the SEBs, which were expected to supplement the efforts of the private Licensees. Section 59 of the E (S) Act therefore provided the basis for tariff determination of the SEBs. As originally formulated, it simply enjoined the SEBs to adjust their charges from time to time so as not to conduct their business at a loss after accounting for subventions received from government. It also envisaged that there may be need to meet expenses on operation and maintenance from capital to be sanctioned by the state government. This was clearly in sharp contrast to the existing provisions for Licensees who were left free to recover charges as appropriate from the consumers. Act 23 of 1978 amended Section 59 of the E (S) Act to specify that the tariff was to be so adjusted so that SEBs earned at least a surplus, after accounting for all subventions and costs, including tax. The rate at which such surplus (defined as income less expenditure, including interest and depreciation) was to be recovered was left to be specified by the state government. Act 16 of 1983 further amended the section to the form in which it stands till today. SEBs were required to so adjust tariffs so as to earn a surplus (defined as income less all costs, including interest on debt) of at least 3 percent. State governments could also specify a higher rate for the generation of surplus. Generally states did not actually do so and SEBs have been unable even to generate the specified minimum surplus.

Till the establishment of central generating stations in the early 1980's, the industry was dominated by private Licensees and vertically integrated SEBs. SEBs could purchase electric power from any person under the provisions of section 43 of the E (S) Act on terms as agreed between the contracting parties. However no defining principles were available for tariff setting and tariffs for individual stations were decided on the basis of mutual consent between the generator and the consuming SEBs. The absence of mandatory norms for tariff setting are said to have led to delays in settlement of commercial terms and required extensive negotiation de novo for every station. This was perceived to be inefficient. Consequently the central government constituted a committee under the chairmanship of Shri K. P. Rao Member (E&C) CEA to recommend alternative methods for the determination of generation tariffs of central stations.

The recommendations of the K.P. Rao Committee can be regarded as a landmark in the history of bulk tariff regulation in India. Four recommendations, which were implemented, significantly altered the tariff setting methodology.

First, the concept of two-part tariff, comprising fixed and variable charges respectively was accepted, though it was only implemented in part. This enabled formal identification of the fixed cost incurred by the generator.

Second, the concept of "deemed generation" was introduced, which delinked the payment of fixed charges from use. Henceforth generators were to recover their fixed cost even if an "available" station was backed down due to system constraint.

Third, changes in risk allocation and efficiency linked returns were effected in the existing incentive structure. Till 1991, the single part tariff was calculated such that full recovery of fixed costs was assured at a PLF of 62.8 percent. Generation below this target level penalized the generator on the recovery of fixed cost, since the tariff got proportionately reduced. Conversely generation above 68.5 percent resulted in significant excess revenue. The formula adopted post 1991 limited both the incentive and disincentive for recovery of fixed costs. The incentive beyond 68.5 percent PLF was lower than before while even with nil generation, 50 percent of the fixed cost was recoverable.

Fourth, for the first time, operational norms were determined for station heat rate, auxiliary power consumption and specific oil consumption. More importantly, the norms were challenging relative to average performance levels at the time and hence laid the basis for Performance Based Ratemaking.

Act No 50 of 1991, introduced Section 43A of the E (S) Act, which specifies that in the case of government owned generating companies, the tariff would be decided by the state or central governments whoever owned the company. Tariff was determined on the basis of operational norms and PLF as determined by the CEA while the rates for depreciation and reasonable return were to be notified by the central government. It was under these provisions that some of the recommendations of the K. P. Rao Committee were notified by the central government and came to be used in tariff determination of central stations.

The Amendment Act No 50 of 1991 also changed the definition of "generating company" to include privately owned generating companies. Accordingly, a fresh set of norms were notified by the central government on March 30, 1992 to determine tariff for both thermal and hydro generating stations to be set up by the Independent Power Producers (IPP) in the private sector. These have been subsequently modified from time to time. Four primary changes were introduced in the determinants of tariff.

First, the recovery of fixed costs was linked to deemed PLF (defined as PLF plus Deemed Generation) thereby making a departure from the past wherein the recovery of fixed costs was linked only to the PLF achieved.

Second, the incentive structure was further revised. In the case of thermal generation the deemed PLF for full recovery of fixed charges was fixed at 68.5 percent. For hydro power the target availability was 90 percent (subsequently reduced to 85 percent in 1998). An incentive in the form of an increase in ROE of upto 0.7 percent points for every 1 percent point increase in deemed PLF was determined along with a penalty calculated as a pro rata reduction in the recovery of fixed cost for deemed PLF below the target level.

Third, along with the increase in the rate applicable for the central generators from 10 percent to 12 percent, the Return on Equity for IPPs was fixed at 16 percent per annum. Central generators in turn benefited from the rate set in 1991 for IPPs when on November 1, 1998 their return was also revised upwards to 16%.

Fourth, against the notional debt equity ratio of 50:50 for central generators, the debt equity ratio for IPPs was revised and the minimum level of equity fixed at 20 percent. The minimum stake of the promoter to be held as equity was fixed at 11 percent of the total capital. A cap was imposed on financing from the Indian Financial Institutions at 40 percent of total outlay (which has subsequently been relaxed).

Fifth, upto 100 percent foreign equity was permitted with foreign exchange risk protection

Transmission

Separate provisions for transmission tariff do not explicitly exist in any of the electricity laws. This is not surprising since unbundled transmission did not exist till the establishment of POWERGRID in 1989. In fact POWERGRID is treated as a generation company under the definition provided in the E(S) Act. The assets of POWERGRID, the sole central government transmission company, were transferred to it from NTPC and NHPC. Tariff was determined and notified by the central government on the basis of techno economic approvals of investments given by the CEA. Consequently the notification dated December 17, 1997 was the first attempt to formalize the methodology of tariff setting. It prescribes a single part tariff comprising all costs on account of interest on outstanding loans and working capital, return on equity, depreciation, O&M expenses as per norms and income tax. The full cost is recoverable at an availability of 95 percent. An incentive is given in the form of increase in ROE at the rate of upto 1 percent point for every 1 percent point increase in availability. A debt equity ratio within the norm of 80 percent maximum and 20 percent minimum has been used for POWERGRID while the rate of ROE is the same as for generation.

In 1998, prior to the coming into effect of the Electricity Regulatory Commissions Act (ERC Act), five sets of norms for tariff setting were in force. One set of norms, specified by schedule VI of the E (S) Act, determines the retail tariff of Licensees under the IE Act. The second set of norms under section 59 of the E(S) Act determines the retail tariff of SEBs. The third set of norms specified by the central government under section 43 A (2) of the E (S) Act determines the bulk tariff of central stations. The fourth set of norms under the section 43 A (2) specifies the bulk tariff for IPPs. The fifth set of norms specifies the transmission tariff for POWERGRID, the sole central transmission company. There is a fair degree of commonality in all the five sets of norms though they are not identical. The effectiveness of all the five sets of norms, in providing incentives for continuous improvements in performance standards, can be questioned. Their relevance in the light of changes in the macro environment and the rapid evolution of the Indian Power Industry may also be in doubt. However, it is well established that each represents an evolutionary stage,

which improved the effectiveness of the regulatory regime in place at the time that these norms were formulated. It is just as clear that significant adjustments are now required if the positive trend, in evidence since 1948, in the evolution of tariff regulation in India is to be maintained.

The legislative changes since 1995 are the next stage in the evolution of power tariff in India. There were three primary changes introduced at that time. First, the constitution of Independent Regulatory Commissions was a major step in the evolution of the process of tariff setting. Second, for the first time the principles of tariff determination were set down in detail in the Act, thus providing a legislative backup to the process of tariff rationalization. Third, for the first time the Act provides a perspective for the future, emphasizing competition, economy, efficiency and equity. We will consider each aspect in detail

The process of independent regulation

The introduction of transparency

The process of tariff determination was traditionally a non-transparent, closed-door exercise. Inadequate data and poor facilities for information collection and dissemination handicapped technical analysis and the use of economic tools. In contrast, the State Commissions, earlier in Orissa and subsequently since May 2000 in Maharashtra, Andhra Pradesh, UP and Gujarat, demonstrated keen interest in making the process transparent by involving stakeholders through a process of dialogue. Towards this end, a number of State Commissions as well as the Central Commission have come out with position papers on different issues concerning the industry, notably on tariff. Some of the Commissions also issued consultation papers on other aspects related to tariff regulation such as cost of capital by CERC and on captive power policy by UPERC.

The universal adoption of the public hearing route by the Commissions is noteworthy because the reform Acts do not make public hearings mandatory. However, the fact that Commissions have the powers of a Civil Court and appeals from their decisions are heard in the High Court may have influenced this trend towards purity of judicial process. It is interesting that India is not unique in this trend. Despite the fact that the Federal Power Act 1935 of the United States specifically exempts hearings in the FERC from the strict judicial process, the trend has been to comply with the due process. The mere exercise of quasi-judicial powers appears to enforce the discipline of the judicial mode of functioning. However Indian regulators have been innovative in their application of the due process. Open house sessions were conducted by the Gujarat Commission where a number of issues, including broader aspects like restructuring etc were discussed. Maharashtra and Uttar Pradesh adopted a very proactive approach of actually reaching out to consumers at six and five locations respectively. An important change brought about by this process is informed decision making made possible by access to data that was earlier not available.

The tariff orders issued by the Commissions have been an important source of this information. The tariff awards issued by all the regulatory commissions are voluminous

documents⁶ with lot of data and information. Time constraints and lack of experience with the process probably constrained a more participative approach.

Table-1 below summarizes the picture on the process adopted and availability of relevant information in the tariff orders issued by the Commissions.

Table-1: Process and information in the tariff orders

	A.P.	Gujarat	Mahara shtra	Orissa	U.P.
Hearings at multiple locations*	X	✓	✓	X	✓
Circulation of draft order	X	X	X	X	X
Calculation of revenue realized with its components from tariff determined by the Commission for the ensuing financial year	X	✓	✓	X	X
Revenue from existing tariff for the ensuing financial year	✓	✓	X	✓	✓
Calculation and rationale for demand forecast	X	✓	✓	X	✓
Date of public notice and last date for inviting objections	✓	✓	✓	X	X
Number of objections received	✓	✓	✓	✓	X

* In Gujarat, these took form of informal open house sessions.

While the move is in the correct direction, a lot more effort in this direction would be required in the future. Lack of rapport and information along with vested interests hurt by the regulatory decisions, could easily backlash into street agitations et al leading to the danger that independent regulation, instead of being a mechanism to resolve conflict and build consensus ends up as an instrument of triggering social, economic and political conflicts⁷. We recognize here that the regulatory outcomes are invariably affected by a number of constraints, including the informational, transactional and administrative and political constraints, which prevent the regulator from implementing his or her preferred policy⁸. The adoption of an inclusive, participatory process under the independent regulation increases the time taken in decision making. However, the time consuming nature of the judicial process becomes less of a real problem when viewed in the context of actual administrative decision making trends in the past. The history of irregular revision of tariffs indicates that timeliness was not one of the virtues of the pattern of administrative decision making. In Gujarat, for example, the tariff revision has been sporadic and long drawn

⁶ More than 75 pages in all cases, some of them being close to 200 pages.

⁷ Prayas Energy Group. February 29, 2000. "Regulators: Walking a tight report." *A Financial Express report*.

⁸ Laffont J J and Tirole J. 1994. *A Theory of Incentives in Procurement and Regulation*. Cambridge, Massachusetts: MIT Press.

exercise in the past. The last general tariff revision for consumes supplied at low tension was effected in January 1992 while for those supplied at high tension was effected in May 1993. A further change for industrial consumers and for railways was effected in October 1996. It however appears unrealistic to expect that the time taken for decision making will improve under independent regulation. A quick survey of the international literature reveals that the regulatory process of resetting the tariff takes anywhere between eighteen to twenty-four months and is accompanied by a series of consultations⁹. In the Indian context, Commissions have bound themselves down to ambitious decision making time frames ranging from three to six months. The result has often been that less concern is given to a wider and more active participation by all stakeholders. There is therefore some truth in the statement that the decision making time frames need to be reviewed in the interests of inclusion, adequacy of information and hence more efficient decision making. Table-2 below presents the details in context of the time taken by different commissions to issue the tariff awards. Gujarat is an interesting deviation where, for reasons discussed later, the tariff order could be issued in more than one year but has resulted in a more participative approach whereby extended hearings were conducted and in richness of information contained in the order.

Table-2: Comparison of the time taken to release the tariff order

	Date of first submission	Date of tariff order	Time to release tariff order	Remarks
A.P.	December 29, 1999	May 27, 2000	5.0 months	
Gujarat	September 14, 1999	October 10, 2000	13.0 months	
Maharashtra	October 15, 1999	May 5, 2000	6.5 months	
Orissa	August 17, 1999	December 30, 2000	4.5 months	Case No. 12 of 1999
U.P.	Feb 15, 2000	July 27, 2000	5.5 months	Dec 31 submission ignored due to enactment of the Reform Act

Functioning, as they do in an environment of data uncertainty and inadequacy of qualified staff, the process of decision making within Commissions tends to be evolutionary. Specifically, regulators may have one prima facie view at the time a petition is submitted. However, after hearing all parties and in the process, discovering additional data and facts, including frequent and significant amendments to data by the parties, the view of the regulators may change considerably. Frequently, a hitherto unexplored line of analysis and evaluation may open up once the hearings have been completed. The inclusion of these deliberations in the decision risks being termed as violative of the basic principle of the judicial process where all parties must get a chance to debate the evidence on which the judge wishes to rely. There are two options for tackling this problem. Either the additional

⁹ Energy Regulator OFGEM published its thoughts on the form, scope and duration of revised price control for electricity grid operator due to come into effect from March 2001. *OFGEM Press release*. March 31, 2000.

evidence can be subjected to a hearing process or it can be incorporated into a decision and the decision itself subjected to a hearing. The latter case implies the issue of a draft order on which comments are invited from all parties. This is a departure from the strict requirements of the judicial process. However it has some validity in the context of regulation being intrinsically different from the exercise of judicial powers. The issue of a draft order enables all parties to react to the displayed mind of the Commission and hence point out areas where they feel the decision is not based on facts, errs in analysis or is otherwise bad in law. This may also avoid an unnecessary resort to appeals. Even if the case goes to the appeal stage, the speaking order of the Commission dealing specifically with the public comments on the draft order will provide an easily understood rationale or justification for the order. The decisions taken by Commissions are highly technical in nature, are very quantitative and involve the adoption of economic philosophies. They do not usually revolve only around questions of law or establishment of relevant facts as the judicial decisions. Hence, allowing parties to react to the mind of the Commission seems fair, just and efficient. It is significant that the process adopted by FERC and by the OFGEM both incorporate the stage of a draft order on which parties get an opportunity to comment and not just on the pleadings of the opposite parties. It is obvious that incorporating the stage of a draft order will increase the time taken for disposal. It may also not be necessary for all cases. Non contested cases, or contested cases of a routine nature where the issues are restricted to establishment of facts may not need this additional stage. However in all cases which have characteristics of rule making, where the consequences are to spill over to other cases, where a fundamental principle is being established, the incorporation of a stage of issuing a draft order can be considered as a measure of process reform.

Empowerment of stakeholders

The strength of the judicial process is that it provides a forum for the thorough exchange of information, facts and opinions between all parties. The limitation of the process is that any asymmetry between the parties in terms of their competence, access to information or ability to utilize the legal provisions of the process will result in skewed results. In the case of public sector utilities in particular the motivation of the managerial cadre representing the utility impacts considerably on the outcome of the case. In the case of small consumer's, poor organizational and representational capacity are similarly limiting factors. This is particularly the case for domestic and agricultural consumers. While some of the States like Gujarat have a long history of strong consumer movement, participation by these bodies in the regulatory proceedings has till now been limited. Designation of an independent public advocate/body to represent the interest before the regulatory agency is a desirable component of the regulatory environment¹⁰. Some of the Commissions, like Gujarat have initiated this practice.

¹⁰ Joskow P.1998. *Regulatory Priorities for Reforming Infrastructure Sectors in Developing Countries*. Annual Bank Conference on Development Economics, Washington, D.C.

Independent functioning of the Commission

The fact that regulatory commissions have necessarily to function in an independent manner and not as an arm of the Government, is acquiring general acceptance. However this does not imply a hands off attitude to be adopted by the government. The relationship between the government and the regulator needs to be one of mutual and constructive support in advancing the public interest. The most notable example is that of Andhra Pradesh, where the Commission received strong support from the Chief Minister who actively campaigned against a roll back of the increase in power tariffs announced by the Commission in May 2000. He likened any roll back to virtual disempowerment of the Commission and felt that such an extreme step would send wrong signals to the prospective investors¹¹. In direct contrast however, the commission in Gujarat was not able to issue the tariff award for nearly a year because of the lack of support from the Government. The Observer report from Gandhinagar claimed that the Gujarat government held back a hike in power tariff in a move that was prompted by the elections to six municipal corporations as well as district and sub-district councils¹². The GERC's award, which was to come in mid-April 2000 was delayed till October 2000 and though the Commission firmly denies that it was under any pressure, official sources claim that the ruling party had impressed upon the Commission to announce its award after the election to the municipalities and the panchayats, as it might affect the poll prospects¹³. In the case of Maharashtra the state government intervened negatively in attempting to waive off the electricity dues of the power loom owners of Bhiwandi. This resulted in the MERC having to specifically disallow any special concessions to this consumer class and some resultant tension between the Commission and the government. The State Government in Orissa seems to have adopted a hands off approach of not intervening in the sector. While this approach is convenient for the government, it does not however assist the process of financing the transition. The sudden withdrawal of subsidy, as in Orissa, puts extreme pressure, either on the tariff or on the financial viability of the utility, or both. However, the overall trend is positive, in that governments are by and large giving regulators the space required for rational tariff determination. Our optimism gels from the fact that it is not unusual for regulatory institutions to take time to mature and establish their independence and credibility. The legislative underpinnings are important but not the sole criterion for successful regulation. As significant is the track record of regulators in dealing with difficult decisions that involve substantial interest group controversy¹⁴.

¹¹ Srinivasan R. August 23, 2000. "Naidu rules out tariff rollback till ERC scrapped." *A Business Standard report from Hyderabad*.

¹² "Gujarat govt puts off power tariff hike." August 15, 2000. *An Observer report from Gandhinagar*.

¹³ Desai D. September 13, 2000. "Gujarat in a fix over power sector reforms". *An Indian Express report from Gandhinagar*.

¹⁴ Gilbert, R. J., and Newbery D M. 1994 The Dynamic Efficiency of Regulatory Constitutions". *Rand Journal of Economics* 25 (4): 538-54.

Regulatory capture by interest groups is another source of potential loss of independence of the regulators. US style regulation has strict "sunlight laws" regulating the conduct of regulators as a group and individually in terms of accepting gifts, communing with interested parties or permitting selective access to information. In India the no specific code of conduct for regulators has been created. Regulators follow a system of self discipline in ensuring that their collective and individual conduct is in consonance with the principles of natural justice unbiased quasi-judicial functioning. India has a tradition of symbiotic relation ship between the Public Sector Utilities and Governments. The apprehension is always there that regulators will succumb to a similar relationship. However the record indicates that this has not happened. Regulators have acted independently, against the perceived self interest of public utilities and in favour of the consumers in Orissa, Maharashtra, AP and UP and at the central level. The same is true in the context of the private sector where regulators have attempted to balance the interests of the private sector with that of consumers. Prominent consumer Advocates like Shri Manubhai Shah of CERS (Consumer Education and Research Society), Ahmedabad are not however satisfied at the level of consumer protection afforded by the Commissions. However even he does not deny that the trend is positive and regulatory capture of Commissions by special interest groups has not occurred. The process of independent regulation is far more satisfactory in this regard than that of administrative decision making adopted previously.

Information and technology requirements for efficient regulation

Firms are better off under asymmetric information since it allows for the extraction of rent¹⁵. It is possible to argue that with most of the regulated agencies still under public ownership¹⁶ managers have little incentive to withhold information since the possible benefits to the utility do not translate into personal benefits for managers. However the fact of withholding information is inherently a passive act and hence easier than the timely provisioning of quality information. Secondly, even public sector managers identify their interest with the firm's interest when it comes to preserving the revenue stream of the utility with no incremental effort.

As significant a reason for the non-availability of adequate, timely and good quality information is the neglected state of the Accounting and Management Information Systems in general which do not permit the generation of such information. As a consequence, Commissions have regularly waived minimum information requirements as an interim measure pending reorganization within utilities. However the ability to control information flow and to game is a crucial element in affecting regulatory outcomes. Regulatory outcomes can be guided in the desired direction by selective disclosures. Alternatively flooding Commissions with more information than they can absorb can also effectively kill careful

¹⁵ Laffont J J and Tirole J. 1994. *A Theory of Incentives in Procurement and Regulation*. Cambridge, Massachusetts: MIT Press.

¹⁶ Except in case of the four distribution companies in Orissa.

analysis of inconvenient facts. Sometimes, when a specific item of information is requested and it is difficult or impossible to delay in providing it, the best tactic is to bury it in a mountain of irrelevant information¹⁷. There is some truth also in the argument that Commissions may have over specified minimum information requirements far beyond their current capacity for useful analysis. The establishment of a useful data bank, over time, is likely to require refinement of information requirements on the basis of experience. Simultaneously, utilities need to gear up their capacity to collect, collate and provide useful information. The case of NTPC in the Availability Tariff hearings in the CERC illustrates that utilities do not necessarily gain by under providing information. Since the utility was unable to provide detailed data on Station Wise Availability the CERC was forced to work with the inadequate data it was given. The end result has been that NTPC considers the targets for Availability determined by the Commission to be unrealistically high.

Implementation of regulatory orders and decisions

The inadequate capacity of Commissions to implement their decisions is clearly an area of concern. The incapacity of the OERC in inducing rapid improvements in efficiency despite performance linked incentives embedded in the tariff. The travails of the CERC vis a vis POWERGRID and NTPC are all examples of regulators not being able to exercise the considerable formal power available to them under the Act to enforce compliance¹⁸. Regulatory neglect, which we define as the ability of the utilities to ignore the directives of regulatory bodies without penalty is an observable and retrogressive trend. For example, no action has been initiated till date (October 10, 2000) by the Uttar Pradesh Power Corporation Limited on the direction of the UPERC to approach the Central Electricity Regulatory Commission, within one month of the tariff award issued on July 27, 2000, for determination of tariff for Tanda thermal power plant owned by the National Thermal Power Corporation¹⁹. Internationally, such negligence of not even requesting the Commission for more time would have drawn a heavy penalty as it is a common practice to impose hefty fines on brigand utilities. We cite here the example of the fine of USD 1.7 million which may

¹⁷ Owen B and R Braeutigam. 1978. *The Regulation Game: Strategic Use of the Administrative Process*. Cambridge, MA: Ballinger Books.

¹⁸ Section 44 of the ERC Act 1998 empowers the regulators to punish the non-compliance with three months imprisonment or with a fine, which may extend to Rs 100,000, or both. Further, an additional fine of Rs. 4000 per day may be imposed for continuing offence.

¹⁹ Information gathered in telephonic discussion with Mr. J L Bajaj, Chairman UPERC, on September 29, 2000. Further confirmed that no such petition has been filed in a telephonic discussion on September 29, 2000, with Mr. D K Joshi, Deputy Chief (Economics), CERC. In Andhra Pradesh the situation is better with the Commission being more or less satisfied with the steps initiated by the utility. Except on one aspect relating to interest expenditure where the commission had requested for more details, the utility appeared to have more or less satisfied the regulator. Information gathered in telephonic conversation with Mr. N Rao, Secretary, APERC on September 29, 2000. In Maharashtra the commission does not appear to have reviewed the situation because of the appeal for review of the tariff award. Information gathered in telephonic conversation with Mr. Sathpathy, OSD, MERC on September 29, 2000.

be imposed by National Electricity Agency (ANEEL) on Brazilian electric utility FURNAS²⁰. The fine would be imposed due to the failure to sign new contracts to buy and sell power as part of an overall regulatory reform within the electricity sector. The utility has already been fined USD 0.9 million for its role in a blackout in March 1999 which left more than half the nation without power for several hours. In the public sector entities, especially in the Indian context where the utilities continue to be in financial loss a penalty may be just another loss without actually making any substantial difference. However, representative penalties may still make some sense from the perspective of sending correct regulatory signals on non-compliance especially for the future.

In summary, the process of independent regulation appears to have vindicated the objectives with which it was installed. The level of transparency has increased with a corresponding increase in the level of participation by stakeholders. Decisions are more inclusive today than they were under the process of administrative decision making. The process is yet far from efficient. Information asymmetries and varying levels of competence across stakeholders restrict the equity and efficiency of the process. Impatience with tardy decision making in the past has imposed impossible time limits on Commissions. Inadequate staffing and analytic capability compounds the fact the information is scarce and of doubtful quality. However these are problems of transition not of direction. The underlying trends in independent regulation are positive. Regulatory Commissions and utilities are starting from fairly low levels of information infrastructure, human resources and managerial incentives. They can only improve.

Principles of tariff determination

Economic regulation is a substitute for the market in situations where the natural monopoly characteristic of industries, as in the case of network utilities, justify such interventions. Regulators are expected to exert pressure on the utility to improve its working to a level at which it would have performed in a competitive market. This model assumes the ability of the regulators to mimic market conditions. Even the partial achievement of such conditions, as demonstrated by experience in U.K, requires substantial effort by the regulatory authorities towards articulating a long-term agenda, defining targets and milestones and designing and implementing the strategy. Where a clear mandate to restructure the market is not available, as in India, pricing strategy is the principal tool available to simulate those conditions.

To achieve the objective of sharing their vision of the electricity sector and specifically of the tariff structures to be adopted to achieve the ends of competition, economy, and efficiency, several Commissions have prepared and issued consultation papers on Tariff Principles and

²⁰ "Brazil's FURNAS is fined for March 1999 blackout and may be fined for failing to sign contract." February 2000. *Global Energy Regulation*. NERA.

Concepts²¹. The papers differ in their style and content however there are significant areas of agreement and not surprisingly a shared vision for tariff setting in general. Six common themes emerge.

- Clearly the task of balancing the budget of utilities is uppermost. Commissions have emphasized the need for financial viability as a precondition for sustainable growth. This concern is however less significant in the paper produced by CERC, possibly reflecting the satisfactory financial condition of the central government generators and the transmission company. In the case of the state level regulatory commissions however, this concern often overshadows efficiency concerns. The Delhi paper assumes that the utility has no control over power purchase or fuel costs and hence recommends a pass through of such costs. Clearly, this approach is contrary to the need for efficiency improvements and better risk management in the bulk power market. However, a positive aspect of the general concern with financial viability is the consensus view of the need for review of the rate allowed to utilities and the limitations of the existing formulation within schedule VI, which inadequately reflects the business risk and is therefore an inefficient incentive for optimum investments.
- Second, the method to be followed for determination of the Revenue Requirement of the utilities has also drawn considerable interest. The consensus is that for the present the existing Rate of Return method bolstered by elements of Performance Based Ratemaking is the only feasible solution. A gradual movement towards PBR is however indicated by the UP commission.
- Third, the method for allocation of costs to customer classes has drawn attention especially in the context of "social rate setting" or subsidization. The approach here is ambivalent. While there is recognition that subsidy must come explicitly from the government, there is a lack of clarity about the consequences of this not occurring. Should consumers be charged what it costs to supply? What are the efficiency limits of cross subsidization? Is all cross subsidization bad and unsustainable? The AP paper discusses the concept of "capacity to pay". Is this a practical pricing criterion?
- Fourth, the Commissions have focussed on tariff design. Should costs and hence charges be unbundled to reflect the cost of different services subsumed under retail supply? Should Time of Use tariffs be introduced? Can tariffs vary with varying cost of distribution? There is consensus that unbundling is required for restructuring of the sector and the introduction of competition. The limitations are inadequate metering and poor information on consumer profiles. These concerns restrict the development of TOU pricing also which is recognized as being efficient and desirable from the view point of demand management.

²¹ (1) "Conceptual Issues of Electricity Tariff in Orissa" Orissa Electricity Regulatory Commission November 11, 1997, (2) Consultation Paper on Bulk Electricity Tariffs " Central Electricity Regulatory Commission, September 15, 1999, (3) "Issues in Tariff Philosophy" Andhra Pradesh Electricity Regulatory Commission, October 19, 1999, (4) "Issues in Electricity Tariff Setting" Uttar Pradesh Electricity Regulatory Commission, (5) "Concept Paper in Tariff", Delhi Electricity Regulatory Commission, September 2000.

- Fifth, the need for tariff reform to be accompanied by managerial efficiencies in the utilities and a lowering of the cost of supply is a predominant common concern. The emphasis on improving system losses in the AP, UP and Delhi papers and the emphasis on improving the Plant Load Factor in the UP paper point in this direction. Also significant is the universal demand that governments clarify their social objectives and support such objectives financially through budgetary allocations. It is significant that no paper has expressed a need for government to distance itself from the process of tariff determination. The demand is for direct, though transparent involvement of the government in the process as a stakeholder.
- Six, there is only tacit and indirect recognition that competitive markets provide economically efficient outcomes. The emphasis is very much on improving the "competitiveness" of the utility rather than implementing a time bound plan for the introduction of competition. It is likely therefore that the advantages of competition, which are now well tabulated worldwide will not immediately, be realized in India.

How effective has the process of issuing consultation papers been? Clearly the preparation of a technical paper itself has value in terms of the skill addition and development of a consensual view within the Commission and the dissemination of such learning to other stakeholders. This has been a significant and positive consequence of these papers. Consultation papers should ideally force Commissions to share their views and their vision with the public. This has not occurred very extensively. By and large Commissions have desisted from expressing conclusions and have confined themselves to listing options. Stakeholders can however discern implicit preferences for a certain option. The process has also been hindered by the fact that, barring Orissa, none of the other Commissions have followed up the consultation paper with a definitive paper on tariff incorporating and dealing with the comments received. One notable lacunae has been the failure of Commissions to acknowledge work done by other Commissions. Though these papers are very similar and have been issued over the period 1997 to 2000, none has acknowledged the work done by previous papers. The tendency is to treat every situation as being unique requiring unique solutions. An opportunity has thus been lost to establish consistency in regulatory approach. There is need for a public recognition that Commissions intend to coordinate efforts and processes.

Link between restructuring and tariff reform

We also note here that while electricity industry continues to be regulated almost universally, mainly on the premise of natural monopoly²², major steps have been initiated to restructure the industry. These include California, which recently was at the centre of controversy due to spiraling electricity prices attributed to the pace of restructuring of the industry. It is instructive to present the case of corporatization in New Zealand where the transformation of the New Zealand Electricity Department (also Electricity Division for few years) into the Electricity Corporation of New Zealand (ECNZ), a state owned enterprise, created pressures to operate as a commercial organization²³.

Box-1: Corporatization in New Zealand

The corporatisation has resulted in reducing the organizational slack that in the generation and transmission sectors was estimated to be almost 3 percent of the wholesale prices. It is reported that since corporatisation, there has been considerable progress in reducing costs, particularly by reducing staff numbers, automating, contracting out competitively, and negotiating new fuel contracts over a period of five years (1987-92). The main results are summarized below.

- a) Wholesale prices have reduced by 8% in real terms.
- b) Unit operating costs (excluding fuel and capital related costs) have been reduced by 13% in real terms.
- c) Sales volumes have increased by 2.6% per annum (in an essentially static economy).
- d) Profits have increased from USD 262 million to over USD 400 million.
- e) Return on equity has increased from 4% to 12%.

- f) Average plant availability increased from 73 to 91% for thermal, and from 87 to 95% for hydro.
 - g) The number of employees was reduced by about 47%.
 - h) Productivity as measured by GWh per employee almost doubled from 4.5 to 8.5 GWh per employee.
-

²² It is interesting to note that some economists and historians have taken violent exception to the concept of natural monopoly. Horace M Gray is one among these critics

"The public utility status was to be the haven of refuge for all aspiring monopolists who found it too difficult, too costly, or too precarious to secure and maintain monopoly by private action alone. Their future prosperity would be assured if they could induce government to grant them monopoly power and to protect them against interlopers.... The obvious conflict between the traditional ideology and the public utility concept was resolved by resort to rationalization. It was said that the enterprises supplying gas, electricity, street transportation, water, and telephonic conversation were 'inherently' or 'naturally' monopolistic; that they had certain 'natural characteristics' which distinguished them from other enterprises.... that because of this 'natural' force, they tended 'inevitably to become monopolies.... Thus, the fiction of 'natural monopoly' was invented to explain the centripetal tendencies then observable....

Also, Rolf W. Kunneke. 1999. Electricity networks: how 'natural' is the monopoly? *Utilities Policy* 8 (1999) 99-108.

Recent technological trends imply a dramatic change of the network economics, leading to possibilities of inter- and intra- network competition, as well as inter fuel competition..... In general, the natural monopoly character of the electricity network is endangered by three major developments: decentral power generation, the evolution of parallel lines and controlled electricity transport and distribution.

²³ J G Culy, E G Read and B D Wright. 1996. The evolution of New Zealand's electricity supply structure, in *International Comparisons of Electricity Regulation*, Ed. Gilbert and Kahn. Cambridge University Press.

Table-3 below provides an indication of the approach adopted by the Commissions in the context of attempting to introduce privatization and competition. However, we do not find any concrete timetable and plan for privatization or introduction of private capital. This is not surprising considering that most of the Commissions are not really authorized to deal with issues of restructuring, which continues to be managed within government.

Table-3²⁴: Approach adopted on restructuring and privatization*

	A.P.	Gujarat	Maharashtra	U.P.
Restructuring and competition	Noted that the competitive markets lead to economically efficient outcomes and that the goal of the commission was to replicate the competitive environment.	Recommended to the Government of Gujarat that separation of generation, transmission and distribution should be seriously considered	No mention	Noted that competition and privatization were desirable objectives and that the public monopolies have led to inefficiencies

Introduction of private sector	Not mentioned	Not mentioned	Not mentioned	Same as above
Approach on captive power plants**	Not mentioned but has issued a separate paper	Not mentioned	Noted that captive power needs to be encouraged, particularly through cogeneration	Not mentioned but has issued a separate paper

*The restructuring of the sector and privatization of distribution has already been achieved in Orissa.

**The approach on captive power plants can be considered as proxy measure to introduce competition in bulk supply markets

²⁴ Tariff orders as below:

1. Case no 1 of 1999, Retail Tariff of Maharashtra State Electricity Board for 2000/2001 dated May 5, 2000
2. Case No 205 to 207/2000, Tariffs of Transmission Corporation of Andhra Pradesh (APTRANSCO), for 2000/2001 dated May 27, 2000
3. Case No 1 of 1999/2000, Tariff Order 2000/2001, dated July 27, 2000
4. Case No 19 of 1999/2000, Tariff Order, dated October 10, 2000

Implementation of tariff strategy

Translation of the tariff concepts elucidated in the consultation papers into strategy has been a complex and challenging job for the regulators because of a number of reasons. Firstly, the extent of under realization of cost on the average requires an average increase of between 30 to 50 percent for the utility to break even at current efficiency levels. Secondly, the impact of this increase has to be borne by those politically sensitive customer classes, like agriculture and domestic, which have been traditionally subsidized. There is little scope for continuing to bleed the industrial sector and large consumers. The tariffs for industry and large consumers have increased over the years far beyond the cost of supply. In most cases, the tariff even exceeds the cost of self-generation and thus provides a perverse incentive for large consumers to abandon grid supply. More significantly, with the overall demand supply imbalance the quality of supply has steadily deteriorated. Voltage and frequency fluctuations are at an extreme level and cause significant though hitherto unquantified loss. Price is a ratio, with money in the numerator and some physical of given or assumed quantity and quality in the denominator and thus price regulation alone is economically meaningless²⁵ unless indexed to quality. Providing the tariff increase required to balance the budgets of utilities has the nasty implication of taking vested political interests head on. It also is difficult to consider because of the sudden burden it would impose on small consumers. Sharp fluctuations in prices are detrimental to commercial functioning. They can result in deviant consumer behaviour and increase the level of theft. Sharp price hikes can also damage the public credibility of reform in terms of their consumer welfare enhancing impact. Lastly, because of the limitations on the government finances most Commissions can not hope to factor in budgetary support for utilities even as a transition measure.

Despite these limitations it is encouraging that there is a definite move towards aligning the agricultural tariff, which traditionally has been the most politicized constituency, with the cost of supply. The average realization from the agricultural consumers in FY 1999-00 was 24.86 paise per kWh as compared to the average cost of supply of 280.88 paise per kWh²⁶. It is commonly asserted that such comparisons are not relevant since current realization is an inaccurate estimate and is artificially deflated by the inclusion of theft and other transmission losses, which are not attributable to agriculture. The realization figures may turn out to be higher when corrected for the consumption figures, which are distorted to conceal the high transmission and distribution losses. Secondly, it is also often said that average cost is not a meaningful comparator since agricultural consumers are supplied only during the night hours and hence should pay only the SRMC or the variable cost of supply. Despite the validity of both arguments, the situation remains that the average realization is still far below

²⁵ Alfred E. Kahn. 1995. *The Economics of Regulation: Principles and Institutions*. Cambridge, Massachusetts: MIT Press.

²⁶ Planning Commission. April 2000. *Annual Report on the Working of SEBs & EDs*, Government of India.

even the SRMC which, back of the envelope calculation show, is 185 paise per kWh²⁷. Hence the move towards bringing agricultural tariffs to costs is welcome. Table-4 below presents the extent of average increase in agricultural tariff in sample states.

Table-4²⁸: Increase in agricultural tariff

State	Date of last tariff revision	Date of new tariff order	Nominal Increase in 2000 tariff order	Average increase per year since last revision
Andhra Pradesh	January 1, 1999	May 2000	61 %	43.1 %
Gujarat	June 1, 1993 ²⁹	October 2000	330 %	44.5 %
Maharashtra	September 1, 1998	May 2000	105 %	60.0 %
Uttar Pradesh	January 25, 1999	July 2000	40 %	26.7 %

While the increase in some of the cases, for example in Gujarat and Maharashtra, may look exorbitant, it has to be viewed in a proper perspective of irrationally low existing tariff structure. In Gujarat, for example, the tariff was actually revised downwards in June 1997 and consumers on an average were paying approximately 20 paise per kWh in 1999/00 as compared to 58 paise per kWh in 1986/87. With the revised tariff it is expected that the consumers will pay approximately 98 paise per kWh in 2000/01 as compared to 58 paise in 1986/87, translating into an average increase of less than 4 percent per annum as compared to an increase of 7 percent per annum in the whole sale price index. There has also been substantial increase in the minimum support prices for agricultural commodities during this period. Hence the rationalization of agricultural tariff is a reasonable step and can initiate several benefits, which become viable at higher tariff levels like energy conservation through improvements in the efficiency of water pumps along with water conservation measures.

²⁷ The average cost of fuel used in FY 1999-00 was 107.9 paise per kWh, consisting of 102.6 paise per kWh of coal cost and 5.3 paise per kWh of oil cost. Adjusting this by an average loss of 21 percent and adding the O&M cost of 10.6 paise per kWh and establishment and administration cost of 37.7 paise per kWh, the total variable cost works out to 184.9 paise per kWh. All data from Planning Commission. April 2000. *Annual Report on the Working of SEBs & EDs*, Government of India.

²⁸ Source: Summary of Tariff Schedules of Electric Power Supply Utilities in India 2000, Council of Power Utilities and Tariff Orders as at footnote 24.

²⁹ Downward revision in June 1997 has been ignored.

Tariff design

Efficient tariff design has played a significant role in assisting the process of tariff rationalization. Gujarat has accompanied the stiff tariff increase with an innovative tariff design which incentivises agricultural consumers, to install meters, through a preferential rate for metered supply as compared to unmetered supply. This was done by designing the flat HP based tariff in a manner that it translates into a higher per kWh charge as compared to the metered tariff. Commissions have also simplified the tariff structure, which over the years had becoming increasingly complex with multiple customer classes and slabs. The effort has been to merge the number of customer classes toward the goal of a single tariff for each voltage of supply differentiated principally by the time of supply and if justified on commercial grounds by the density and location of supply. Accordingly the number customer classes and the consumption slabs within each customer class have been rationalized and reduced. Further steps in this direction included merger of a number of additional/surcharges into demand or energy charge appropriately. Fuel surcharge, which used to be an issue of much controversy has also been merged with the energy charge in most of the cases. Table-5 below provides the details regarding rationalization of consumer categories.

Table-5³⁰: Rationalization of tariff structure

Number of tariff categories	Before	After	Reduction
LT			
Maharashtra	8	7	1
Andhra Pradesh	8	8	0
Uttar Pradesh	9	9	0
Orissa			
GRIDCO	Not relevant		
DISTCO'S	7	7	0
Gujarat	11	11	0
HT			
Maharashtra	15	12	3
Andhra Pradesh	6	6	0
Uttar Pradesh	5	3	2
Orissa			
GRIDCO	Not relevant		
DISTCO'S	7	7	0
Gujarat	7	7	0

The level of tariff simplification, which has already occurred, is minimal and considerable scope exists for further rationalization. Commissions have been constrained in this effort by

³⁰ Tariff orders as at footnote 24

two main factors. Firstly the inadequacy of disaggregated billing data makes customer class wise consumption patterns difficult to assess. Hence rearranging classes and tariff slabs imposes revenue risk for the utility, which is difficult to quantify. Secondly tariff simplification tends to increase the burden of adjustment for currently subsidized customers. With the need to fill the revenue gap already exerting stress on currently subsidized customers Commissions have been rightly cautious in aggravating this problem. Clearly however this is an area where extensive work still remains to be done.

Unbundling retail tariffs by allocating costs to the components of energy service is another exercise which remains relatively unexplored. Customers need to be charged separately for the following services:

1. Bulk power purchase
2. Transmission system costs including transmission loss.
3. Distribution system cost including distribution loss.
4. Retail supply cost including metering, billing, collection and customer servicing.

Under each of the four major cost heads costs can be further sub-classified as fixed or variable and charged for accordingly. Data for cost involved with providing above services for a representative state is presented in table-6 below.

Table-6: Cost of providing different services (Rs./kWh)

Head	Bulk power	Transmission system cost	Distribution and retail supply costs
Total	2.08	0.35	0.97
<i>Fixed</i>	0.68 (33%)	0.24 (69%)	0.62 (64%)
<i>Variable</i>	1.40 (67%)	0.11 (31%)	0.35 (36%)

In comparison most retail tariffs today are single part and do not distinguish between the four separate components of retail supply. Charging these separately has two advantages. First, it forces utilities to account for these costs separately which builds the data base needed in future for unbundling these services. Unbundling is necessary not only to optimize allowable cost through benchmarking under PBR or COS but also is a pre condition for moving to retail choice. Second, unbundling costs focuses the attention of stakeholders on those costs, which they can control. Generally customers have no control over the fixed costs of the utility. They can avoid or reduce only the variable costs. From the regulators perspective, fixed costs are inert costs which can be changed only once at the time that they are incurred and hence can be ignored beyond that stage. What is more vital from the view point of bringing about short run efficiencies are the variable costs which are changeable and hence controllable.

Commissions have devoted considerable effort to redesigning tariff charges. This aspect relates to the allocative efficiency, to which little attention was paid in the past. Allocative efficiency requires the goods to be distributed in a manner that they are received by those

who obtain maximum benefit from them, and this can be achieved by relating the prices to the marginal cost. However, the price setting has in the past took no cognizance of the economic theory and the prices have over the years evolved so as to include a heavy dose of cross-subsidy. This has resulted in industrial consumers moving of the grid to self-generation.

The Commissions attempted to correct the historical distortion in the recent set of tariff orders. It was however possible to pay more attention to this aspect as has been paid to the productive efficiency, which requires that electricity is produced at the minimum possible cost. That by limiting the rate of return in itself does not result in efficient allocation is a point brought out very clearly by Shepherd and Gies³¹. The microeconomic theory in contrast to looking at the overall return is interested first and foremost in the determination of individual prices³². The optimum amount of total revenues is conceived to be the result of the process that operates in individual markets in fixing prices of individual prices. And as far as question of determination of individual prices is considered, the principle of microeconomics is very clear: prices should be equated to the marginal cost. We however find insufficient recognition of the concept and its application. The regulatory commissions need to be guarded of the tendency, which is evident in US also, where the regulators have been criticized for applying basis other than economic efficiency. Similarly, while some steps towards time of day tariff, reducing the mismatch between fixed liabilities and revenue from demand charges etc. are evident, it was perhaps possible to achieve more. Table-7 below provides a comparative position on steps towards allocative efficiency.

³¹ So whatever the rates of return may actually have been, they cannot by themselves demonstrate whether resource allocation (in and within the utilities) has been efficient. William G Shepherd and Thomas G Gies. 1966. *Utility Regulation: New Directions in Theory and Policy*. Random House, New York.

³² Alfred E. Kahn. 1995. *The Economics of Regulation: Principles and Institutions*. Cambridge, Massachusetts: MIT Press.

Table-7³³: Allocative efficiency in tariff setting

	A.P.	Gujarat	Maharashtra	Orissa	U.P.
Application of marginal cost	No mention	No Mention	No Mention	The Commission has moved away from application of marginal cost because of lacunae in database and executing machinery	The Commission has examined the possibility of application of marginal cost through aligning the energy charges with SRMC
Time of day tariff	Not applied	Applicable in the existing tariff structure. The Commission has provided further incentive by substantially increasing the night time concession	Introduced for HT Industrial consumers. Also noted that it is a critical tool for Demand Side Management	Not applied	A surcharge exists for HT category but it is more in form of a charge for making energy available during restricted hours
Reduction of mismatch between fixed liabilities and demand charges	Little progress. No demand charge for domestic or commercial consumers	Noted that it would be practicable to link demand charges with corresponding fixed cost incurred	Observed that it is a desirable objective	No further movement after the second tariff order in 1998.	Some progress. Two part tariff introduced for all categories except unmetered category

³³ Tariff orders as at footnote 24

Methods of tariff determination

Cost of service approach

Commissions continue to be strongly influenced by the provisions of Schedule VI of the E(S) Act. This is not surprising considering that the ERC Act and all the state Acts require them to do so and depart from it only for reasons to be recorded in the interests of economy and efficiency. Accordingly, the primary focus of the Commissions so far has been to scrutinize the expenditures and to pare them down to more efficient levels. The revenue requirements were thus reduced, sometimes dramatically on the basis of what was considered reasonable. The Orissa case is a good example. The OERC in its first Tariff order for 1997/98 focussed on the high T&D loss of the utility; GRIDCO. Against an estimated loss of 46.6 percent in the previous year (subsequently said to be under stated) the OERC allowed a T&D loss of only 35 percent. The OERC disallowed 22 percent of the costs projected by the utility on the grounds of high T&D loss and other inefficiencies. In the subsequent year disallowed costs dipped marginally to 18 before increasing to 22 percent in 1999/2000. The MERC, APERC and UPERC have respectively disallowed 9 percent, 7 percent and 14 percent of the projected costs of the utilities³⁴. There is some truth in the argument that faced with significant deficits not only in the Test Year but also in the projected period in all utilities, as per Table 8 below, regulators have concentrated primarily on somehow balancing the revenue requirement of the utility with the potential revenue.

Table-8³⁵: Revenue deficit (Rs. Crores)

State	Estimated deficit
Maharashtra	2434
Andhra Pradesh	2917
Uttar Pradesh	2404
Orissa	
GRIDCO	488
DISTCO'S	493
Gujarat	1145

They have also generally assumed a glass ceiling on potential revenue on the basis of a maximum assumed increase in the tariffs of different consumer classes. This ceiling can vary depending on the base level of subsidisation or taxation for that consumer class, its assumed capacity to pay, its share in total consumption and its political clout.

In this process of balancing future estimated revenues with costs, regulators are focussing on the "reasonableness" of estimated costs. Industry best practice standards are being used to benchmark the allowable costs for utilities. While application of best practice standards is a legitimate objective even under the cost of service (COS) approach of Schedule VI, the

³⁴ Ahluwalia Sanjeev.S. "Power Tariff Reform in India" Economic and Political Weekly, Vol XXXV No 38, September 16-22.

³⁵ Tariff orders as at footnote 24

only issue is that benchmarks have to be achievable and the time frame for achievement, realistic. The problem with the COS approach is that it does not allow for the formal institution of performance benchmarks well in advance. Costs are allowed or disallowed arbitrarily as a part of tariff reviews. There are no definite price signals in advance, which the utility can react to beyond the general one that costs have to be reduced. More importantly, there is no incentive to reduce costs in advance of the regulator doing so. The utility is not rewarded for unilateral improvements in efficiency. Instead these can become the cause for further contraction of the allowable cost in the next review with the regulator gladly accepting costs where they are low but reducing them where they are high. With a more proactive style of tariff regulation since the onset of independent regulation and hence more frequent and more intensive reviews³⁶ the perception of regulatory risk amongst utilities has increased.

The Cost of Service approach failed in the pre 1996 period to ensure the financial viability of utilities. This failure was ascribed to the method of its application and political intervention rather than any inherent flaw in its structure. Its use by independent regulators has not changed matters significantly. Utilities continue to be suffering from significant imbalances in the revenue and costs. The Orissa case is a good example because it is the only example where independent regulation has been applied over a period of four years. During this period 1996 to 2000 the total accounts payable, which can be treated as a proxy for the loss, for all the five utilities put together increased from Rs 465.5 crores on April 1, 1996 to Rs 1160.4 crores on March 31, 2000. The alternative is to try the PBR approach or alternatively the Revenue/Price Cap approach.

Performance Based Ratemaking

The alternative to the cost-plus approach is the PBR (performance based ratemaking). The PBR approach, while recognizing the revenue requirement of the utility, provides incentives for improving efficiency and reducing costs. It weakens the link between the utility's regulated prices and costs by decreasing the frequency of rate cases and/or by employing external measures of cost³⁷. The control aspects of regulation are thus sought to be replaced with a system of incentives and penalties through institution of industry wide norms. As a result, the PBR creates incentives, which are similar to those that would exist in a competitive market place. Such a system would reward efficient management while inefficient ones would sooner or later be thrown out. PBR also eliminates the tendency of utilities under the cost plus regulation to be more capital intensive, known as the *Averch-Johnson effect*, than they would be in competitive environment.

³⁶ The OERC has reviewed the bulk and retail tariff three times since April 1997.

³⁷ G A Comnes, S Stoft, N Greene and L J Hill. November 1995. *Performance-Based Ratemaking for electric Utilities: Review of Plans and Analysis of Economic and Resource Planning Issues, Vol I*. U S Department of Energy.

International experience in regulatory reform and implementation of PBR schemes suggest that significant efficiencies in investment are possible. Productivity in the UK electric power industry has increased from around GBP 40,000 per employee in 1980 to GBP 170,000 in 1998 in constant 1995 prices³⁸. In India also the adoption of the PBR approach has worked extremely well in the case of NTPC. In 1992, as a result of the work done by the K.P.Rao Committee, operational cost norms were specified by the Government of India under section 43 A (2) of the E(S) Act for National Thermal Power Corporation (NTPC). These norms specified the heat rate, auxiliary consumption rate and the schedule for recovery of the capacity charge comprising Rate of Return on equity and Operations and Maintenance expenses linked to achievement of the Plant Load Factor/Availability of the unit. Achievement in excess of the cost norms is retained by NTPC while all costs incurred above the cost norm are borne by NTPC. The norms were valid for five years. During this period, the NTPC's profit before tax (PBT) grew by over 28 percent per annum from Rs 735 crores in FY 1991-92 to Rs. 4195 crores in FY 1998-99. Similarly the ratio of PBT to net assets grew from 6.1percent to 26.4 percent. The norms are still to be revised by the Central Electricity Regulatory Commission, to whom the jurisdiction of regulating the tariff of central generators was transferred in May 1999.

There is also clear evidence of the fact that the Commissions are not only aware of the advantages of PBR over COS but are actively adopting it. The UP commission benchmarked the administrative and overhead costs of the utility to the national average as

a target and on that basis reduced the allowable expenditure. It similarly compared the performance of the generation segment with the national performance benchmarks and found it severely lower. In Maharashtra, the Commission has required the utility to reduce the cost of power purchase using the merit order principle. In Orissa, the Commission has been innovative in linking efficiency gains beyond the target level prescribed by it to a corresponding increase in the return earned by the utility thus providing a powerful incentive for performance well in advance in the best traditions of PBR. These are stray instances however inadequate data, the lack of a historical perspective and relative unfamiliarity with PBR have restrained regulators from a more complete and formal adoption of PBR. In Maharashtra, for example, the Commission approved the Operation and Maintenance expenditure of Rs. 675 crores as requested by the MSEB. This translates into 16.22 paise per kWh as compared to the national average of 10.60 paise per kWh and 8.63 paise per kWh in Gujarat, which is a comparable utility³⁸. Requiring the MSEB to operate at the national average would have resulted in a saving of nearly Rs. 239 crores. This illustrates that the Commission has not rigorously adopted the principle of PBR. Had it done so, it would have needed to establish performance benchmarks for all major cost heads. In view of the relative inefficient levels of operations, it is conceivable that such benchmarks would need to be projected several years in advance so as to bring in efficiency improvements over time and give an opportunity to the utility to adjust to the new efficiency levels.

³⁸ Electricity Industry Review" January 2000, Electricity Association Services Limited, London

³⁹ Planning Commission. April 2000. *Annual Report on the Working of SEBs & EDs*, Government of India.

What are the advantages in formally adopting a PBR approach? First, since the PBR schemes generally have a longer duration, typically of upto five years, the regulatory risk emerging from reviews is reduced. In the Indian context, infrequent reviews with annual performance parameters announced in advance, eliminates the problem of political interference. Second, since performance parameters are determined on the basis of industry wide norms and not the costs and performance standards of any individual utility, the potential for realizing rent due to information asymmetry is reduced. Infrequent tariff reviews also free the government and the regulators to focus on other tasks including improving the quality of supply, enforcing tighter customer service standards, grievance handling and the sustainable development of the electric supply industry. These are important tasks, which are vital for the sustainable implementation of reforms. In the current context these get neglected since the entire attention gets focussed on tariff determination which is an annual exercise. If tariff rationalization is to be delinked from reform, restructuring and privatisation, efficiency improvements and improvements in the quality of service provided to consumers are necessary. This becomes difficult when then the limited capacity of the Commissions is devoted extensively to tariff determination. Often regulators may need a longer time interval between rate reviews to develop the analytical capacity to prepare for the next review. Regulators may use such longer time interval to publish consultation papers and review the results of the associated hearings so that tariff reviews do not happen in a vacuum of uncertainty. The reduction of regulatory risk is an important precondition to privatisation⁴⁰. The adoption of PBR will assist in this process. PBR also provides advance signals which efficient utilities can use to optimize operations. The longer interval between tariff reviews also assists in preserving the benefits of efficiency enhancement within the company. Under COS, there is always a risk that the benefits of efficiency improvements will be passed

The second important dimension of the PBR plan is its term. The firm, during the term of the plan has an opportunity to take advantages from the efficiency enhancement investments. The longer the term of the plan, the stronger the incentives for such investments. If the term is too short, utilities become subject to *ratchet effect*⁴¹, under which they will not even try to make a cost-effective investment because they may not recoup their productivity-improving investment and will have to try harder in the future just to break even⁴². It is interesting to note that the idea of long term plans actually traces its history to the regulatory lags under cost plus regulation. Vogelsang and Finsinger have demonstrated that basing a firm's allowable prices in one year on its cost in the previous year could provide the firm with the incentive to adopt a pattern of prices that converged to the efficient level⁴³. Regulatory commitment to the plan and selection of appropriate indices for benchmarking performance are also important criteria. The PBR plans also often include mechanisms for sharing earnings with the ratepayers. While the economic theory prescribes that the utility's best incentive to efficiency enhancing investments is to retain all of the incremental earnings, the regulatory commissions as well as a number of experts⁴⁴ have argued and preferred sharing of above the benchmark earnings with the ratepayers. Allowance for unforeseen circumstances (commonly known as the Z factor), events or cost items which may outside the utility's management control, is another typical characteristic of the PBR plans. The important criteria for approving the Z factors should be a clear understanding of the risks that the regulator wants the utility to bear and these may or may not necessarily be items that are outside of their control. Thus, while the economic theory prescribes that the risks should be allocated in a manner that they are borne by those who are best placed to bear it and although certain risks may be beyond the management's control, they nevertheless fall right within the range of risks that businesses in competitive markets must bear and hence the management's should, therefore, be charged with managing the exposure to such risks through investment decisions and cost controls⁴⁵. This argument provides an interesting twist to the inclusion or a promise for inclusion of fuel adjustment clause in most of the reform acts and subsequently the tariff awards. Since the fuel adjustment clause allows recovery of every additional rupee spent on the fuel, they provide

⁴¹ Laffont J J and Tirole J. 1994. *A Theory of Incentives in Procurement and Regulation*. Cambridge, Massachusetts: MIT Press. "The rent extraction concern gives rise to the celebrated ratchet effect. The regulator infers from a high performance an ability to repeat a similar performance in future and becomes more demanding. Consequently the firm has an incentive to keep a low profile".

⁴² G A Comnes, S Stoft, N Greene and L J Hill. November 1995. *Performance-Based Ratemaking for electric Utilities: Review of Plans and Analysis of Economic and Resource Planning Issues, Vol I*. U S Department of Energy.

⁴³ Vogelsang and J Finsinger. 1979. Regulatory Adjustment Process for Optimal Pricing by Multiproduct Monopoly Firms. *Bell Journal of Economics* 10 (1) 157-71.

⁴⁴ Marcus W B and D M Grueneich. 1994. *Performance-Based Ratemaking: Principles and Design Issues*. San Francisco, CA: Energy Foundation.

⁴⁵ The Regulatory Assistance Project. *Best Practices Guide: Implementing Power Sector Reforms*. The Energy Group, Institute of International Education for Office of Energy, Environment and Technology (EET), USAID.

through to consumers. Hence both PBR and the Revenue Cap/Price Cap approach are more conducive to efficiency enhancements than COS.

The design of a PBR plan involves an assessment of the behavioral pattern that is sought to be encouraged or discouraged as also the defining the allocation of risks between the customers and the investors. The objectives that the programme is supposed to achieve should be defined as clearly as possible at the outset. In India, the possible regulatory goals can be to provide powerful incentives for cost reduction, improving the quality of supply and service, to encourage efficiency in use and to promote use of renewable and alternative forms of electricity. It is often useful to do a comparison of the PBR scheme with the existing cost plus regulation and define how the PBR mechanisms would more effective in achieving the sought objectives.

⁴⁰ Vijay Chawla. August 4, 2000. New tariff puts KESCO privatisation in peril. *A Business Standard Report* from Kanpur.

The new power purchase rate, fixed by the UP power regulatory commission, has jeopardized the privatisation chances of the Kanpur Electricity Supply Company (KESCO). At Rs. 2.15 per unit power purchase rate, KESCO will be incurring a loss of Rs. 174.53 crore per annum.

the utility with a zero cost insurance policy. They also create disincentives for investing in fuel efficient and renewable technologies as also for operating the units efficiently.

Further, there are certain pitfalls that the regulators need to guide against in designing the PBR schemes. Under the PBR scheme, the firm will have a tendency to increase the profits by reducing the quality of service and hence inclusion of penalty clauses on appropriate service quality parameters is desirable. In U K for example, the violation of service quality standards often results in payments directly to the affected customers thereby providing sufficient incentives for maintaining or infact improving the quality of service. It is thus incumbent on the regulatory commissions to keep a constant track on the service quality and devise penalty that is sufficiently high to retain the managerial attention. The PBR schemes are also associated with being non-equitable to the consumers. These concerns arise because of the above markets returned associated with PBR, fewer opportunities to air grievances/litigate against the tariff and because it leads towards Ramsey prices which are often perceived as unfair by the commissions⁴⁶. It is critical to ensure good quality database to implement successful PBR schemes and it should also be noted that PBR schemes also require significant regulatory input and oversight though the focus of attention is to ensure maintenance of quality rather than judging the prudence of expenditure.

The application of PBR to whole sale tariffs, particularly for central government owned generators, has been continuing for a decade now. The need of the hour is to formalize the demise of COS regulation and its replacement by a hybrid of PBR and Price Cap regulation. All ERC have already adopted an informal Price Cap regulation in the case of industrial tariff which have been increased only by the rate of inflation or less. This move should be formalized and extended to all customer classes which are currently "taxed". These customers should know that over the next five to ten years their tariffs would decline in real terms. Instituting a RPI minus X type of formula applicable for atleast five years for these customers will induce certainty and allow such customers the freedom to plan ahead. Declining tariffs will also reduce the incentive for self generation and thus pull industrial customers back into the grid. Price Cap regulation can also be used to contain the tariff shock from the withdrawal of subsidy. Price Caps, possibly corresponding to the capacity of a consumer class to pay or the marginal value added by incremental use of electricity, should be notified as efficient limits for tariff increase over time. The notification of such caps will serve a dual purpose. First it will allow governments to justify the provision of subsidy for the customer class, where there is a danger of the cap being breached. It will also facilitate the budgeting of subsidy in a medium term perspective. Secondly, it will also guide the ERC in tariff setting. The uniform adoption of Price Cap regulation in a more general way will have to await stabilization of the system. Secondly, the usefulness of Price Caps to meet large increases in capacity is somewhat uncertain. The incremental capacity requirements of the system can best be met under PBR, which allows a somewhat higher level of collaboration between the ERC and the utility.

⁴⁶ G A Comnes, S Stoft, N Greene and L J Hill. November 1995. *Performance-Based Ratemaking for electric Utilities: Review of Plans and Analysis of Economic and Resource Planning Issues, Vol I*. U S Department of Energy.

The adoption of PBR is a fitting replacement for the Cost of Service methodology of tariff setting. Its application, so far, has been sporadic, selective and inconsistent. The results have, not surprisingly, been lopsided. PBR has been applied to areas like T&D loss reduction, where the intention is to squeeze utility profits. However other areas, where operational costs have reduced, continue to be regulated under Cost of Service thus depriving the utility of efficiency enhancements in these areas. Regulatory Commissions need to formally adopt PBR through the notification of appropriate tariff regulations, which will establish the cost, and performance standards against which utility Revenue Requirements are to be tested. This is essential if the gains from efficiency enhancement are to accrue in a timely fashion during the process of transition. The transition to fiscal stability of the electric power system is a period of severe financial stress. Hence a combination of PBR and Price Cap regulation appears to meet the needs of the transition far better than the traditional Cost of Service Regulation. Its demise need cause us no discomfort.

Conclusions

Restoring the financial viability of utilities has been the focus of measures of tariff reform initiated in 1998 (1996 in Orissa) via the Electricity Regulatory Commissions Act 1998 and in the State Reform Acts. Including the central level, thirteen commissions are functional which cover over two thirds of the power supply. Of these, six, including the CERC, have issued tariff orders apart from initiating other regulatory proceedings. Other Commissions have not yet issued tariff orders though other proceedings have been held. The process adopted for the conduct of their proceedings has uniformly conformed to the judicial pattern thus ensuring transparency, fairness and equity. There have been some innovations like informal hearings and a proactive approach to siting the hearings by taking them close to the petitioners. In several cases, the strict rules of evidence have also been relaxed, keeping in view the expense involved in adhering to these rules and with a view to allow for wider participation. However no Commission has so far adopted the standard practice prevalent in the US and in the UK of exposing the mind of the Commission and seeking comments on the views of the Commission prior to finalizing the order. The restraint seems to be apprehensions that this will increase the time for disposal of petitions, that it may be unnecessarily dilatory and that it does not fit well with the exercise of judicial powers. Commissions have also been restrained in promoting the inclusiveness of hearings and actively encouraging participation by stakeholders and by the tight time schedules prescribed for decision making. In general however the process adopted under independent regulation has changed the scope and the range of participation by stakeholders in tariff determination. The process of tariff setting has become inclusive, the level of technical analysis has improved which has reflected positively on the quality of the decision making in this regard.

Commissions have a difficult task in implementing tariff reform. With extreme levels of tariff distortion, uncertain political support, withdrawal of subsidies by governments from hitherto beneficiary public utilities and the continuing uncertainty of industry restructuring, the

degrees of freedom available for Commissions to implement tariff reform strategies are limited. It is praiseworthy that Commissions have responded with a blend of technical sophistication and restraint in addressing this problem. Without formally departing from the framework of cost of service tariff determination elements of the Performance Based Ratemaking have been introduced thus bolstering administrative fiat with economic incentives. The utility response to such economic incentives has not been assessed so far except in the case of Orissa. In Orissa there is hope that the private owners who have now been in operation for over an year now would respond more proactively to economic incentives than the publicly owned utility did previously.

Tariff reform will work well where the government continues to support the process financially. It will be more efficient where there is a private utility in place to respond to the economic incentives devised by regulators. It will succeed where regulators resist the temptation of revising tariffs frequently or in tightly controlling the utility's profits. Tariff reform will be more efficient where regulators are assured functional independence, adequate competent staff and facilities. The legislation has already provided the basis for successful independent regulation and tariff reform. The key is in devising an implementation strategy that ensures the continued active participation of all stakeholders. So long as public utilities are service providers, a major part of the tariff reform effort lies with governments. Unless public utility management is improved and the cost of supply aligned to efficient levels, regulators will be constrained to continue to disallow costs, thus perpetuating the financial crisis, which they were expected to reverse. Regulators can never be efficient managers. They can only create the enabling environment within which efficient managers can function. In the absence of such managers the efficacy of independent regulation is diluted. It is upto governments to bring the process of industry restructuring to a logical conclusion by privatizing utilities. The experience in Orissa, Maharashtra, AP, UP and Gujarat has shown that poor management skills, inadequate managerial incentives, non responsive management, lack of public accountability and the continued lack of autonomy in public utilities are significant barriers to the financial viability of the electric supply industry in India. These are challenges that independent regulation is not mandated to meet.